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# KEY

TO THE

## INTRODUCTION

TO THE

# NATIONAL ARITHMETIC,

EXHIBITING THE OPERATION OF

THE MORE DIFFICULT EXAMPLES

IN THAT WORK ;

FOR THE USE OF TEACHERS ONLY.

---

By BENJAMIN GREENLEAF, A.M.

PRINCIPAL OF BRADFORD TEACHERS' SEMINARY.

---

NEW STEREOTYPE EDITION.

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1859.



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---

Two editions of the NATIONAL ARITHMETIC, and also of the COMMON SCHOOL ARITHMETIC, one containing the ANSWERS to the examples, and the other without them, are published. Teachers are requested to state in their orders *which edition* they prefer.

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## PREFACE.

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THE object of the author, in this publication, is to aid the teacher in communicating instruction to his pupils, and in detecting any error which they may have made in the operation of the examples.

Every instructor, who has a large number of scholars under his care, is aware that it is a great tax on his time, especially when in school, to examine the operation of many arithmetical questions; whereas, by the aid of a Key, he may readily detect any mistake in the operation. Besides, amid the labors of the school-room, it is often very difficult for the most able arithmetician to recollect, at the moment, all the principles involved in the solution of difficult questions; but, by recurring to a Key, this difficulty will be obviated.

The author would recommend to teachers never to point out *directly* to the pupil the method of solving a problem, nor perform the labor for him, but suggest and explain such principles as will enable him to perform the question himself.

The answers to all the examples in the Arithmetic are inserted in the Key, for the convenience of those teachers who may prefer to use the edition of the Arithmetic which does not contain the answers.

B. GREENLEAF.

*Bradford, Mass., Feb. 16, 1857.*

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# K E Y

TO

## GREENLEAF'S INTRODUCTION.

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### NOTATION AND NUMERATION.

#### ROMAN NOTATION.

2. (ART. 3, p. 9.)	LXXXVII.	6.	DXLII.
3.	OX.	7.	MCCCXIX.
4.	CLXIX.	8.	MDCCCLVIII.
5.	CCLXXV.		

#### FRENCH NOTATION AND NUMERATION.

1. (Art. 13, p. 13.)	47	10.	408,096
2.	359	11.	5,402
3.	6,575	12.	907,805,074
4.	908	13.	847,915
5.	19,000	14.	89,047
6.	1,504	15.	51,081
7.	27,000,500	16.	7,395
8.	99,099	17.	57,059,099,047
9.	42,002,005		

#### ENGLISH NOTATION AND NUMERATION.

1. (ART. 16, p. 15.)	325,412
2.	214,165; 078,056
3.	42; 617,031; 041,342
4.	2,008; 009,082; 701,808

## ADDITION.

3. (ART. 20, p. 19.)	978	7.	698
4.	889	8.	999
5.	998	9.	439
6.	669	10.	868
10. (ART. 23, p. 21.)	3555	35.	694764
11.	3212	36.	156800
12.	1922	37.	1802790
13.	3175	38.	76833457
14.	27891	39.	1111110
15.	289436	40.	9323
16.	354409	41.	7693486
17.	347514	42.	3155917
18.	382898	43.	2643
19.	26027511	44.	1039
20.	1366855	45.	227934
21.	6908906	46.	63315
22.	142885	47.	2373544
23.	21616	48.	8272 dollars.
24.	766503	49.	131 trees.
25.	13814	50.	1563 pounds.
26.	969754	51.	2103 dollars.
27.	11720	52.	2257 dollars.
28.	31622	53.	500 dollars.
29.	949661	54.	9115 dollars.
30.	86578	55.	2728116
31.	539658	56.	6624988
32.	57372	57.	3952837
33.	848340	58.	3321317
34.	1000779	59.	6564818
2. (ART. 24, p. 24.)	95947	5.	113378
3.	102201	6.	86621
4.	100536		

## SUBTRACTION.

8. (Art. 32, p. 30.)	47896	25.	799690466
9.	265899	26.	24974975
10.	587544	27.	89901
11.	377778	28.	90909091
12.	9393239896470	29.	999991
13.	1	30.	2967
14.	471112	31.	99995000
15.	981012	32.	767 dollars.
16.	1	33.	39 years.
17.	9998392	34.	105 years.
18.	6097700810072	35.	4731
19.	7977100909213	36.	6122423 inhabitants.
20.	7100061569937	37.	16817082 bushels.
21.	500710920089	38.	2246193 bushels.
22.	1	39.	6181001 dollars.
23.	455555556	40.	577904
24.	8753086431	41.	49841021 miles.

2. (Art. 33, p. 32.) 2588 acres. | 3. 3528 dollars.

## MULTIPLICATION.

9. (Art. 36, p. 36.)	6910677	14.	50246229
10.	7012310120	15.	60725 dollars.
11.	53580296	16.	228456 dollars.
12.	24881985	17.	27918 letters.
13.	105185376		

(Art. 40, p. 39.)		12.	10989 dollars.
8.	611 dollars.	13.	13505 miles.
9.	2813 dollars.	14.	8760 hours.
10.	35599 dollars.	15.	5481 gallons.
11.	1853654 dollars.	16.	200451 dollars.

17.	68816 pounds.	26.	532088
18.	321300	27.	3831635
19.	518077	28.	1462126
20.	881919	29.	264640056
21.	9691836	30.	99070437
22.	18219071	31.	826888542
23.	70287492	32.	290355807
24.	153288487686	33.	721361144
25.	49062139937803	34.	8798979491
2. (ART. 42, p. 41.)	765325	6.	2851200 inches.
3.	123396	7.	631152 hours.
4.	611226	8.	68520 feet.
5.	987625		
2. (ART. 43, p. 42.)	23560	4.	7964000
3.	587300	5.	9872500000
(ART. 44, p. 43.)		10.	910089999000
4.	72103581726300	11.	24010024010000
5.	490154012100000000	12.	400400800400400
6.	28522743249000	13.	1224241200000
7.	4179911100000	14.	14122412100
8.	11717175236000	15.	18000220000
9.	69660900000000	16.	1100022000000

## DIVISION.

	Quotients.	Rem.			Quotients.	Rem.
5. (ART. 50, p. 48.)	757913	0	15.		186529	6
6.	1460898	1	16.		958131	11
7.	141090	5	17.		1135791	1
8.	47316	4	18.		162255	6
9.	994864	8	19.		202818	6
10.	698082	1	20.		225353	3
11.	528776	9	21.		187794	2
12.	79992	4	22.		170721	9
13.	55096	6	23.		78715 dollars.	
14.	54848	5	24.		17167 acres.	

25.	876451 dollars.	29.	109517 acres.
26.	14888 dollars.	30.	371 dollars.
27.	9589 bushels.	31.	1315
28.	99483 yards.		

	Quotients.	Rem.		Quotients.	Rem.
2. (ART. 51, p. 50.)	216	0	4.	13717421	0
3.	89786	10	5.	32534467	5
10. (ART. 54, p. 52.)	234		27.	5502	95
11.	365		28.	9755	4060
12.	145	6	29.	3453	7122
13.	7634	0	30.	30003	0
14.	5204	11	31.	26750	962
15.	290720	25	32.	86268755	480
16.	68549	88	33.	8428688	22346
17.	240415	5	34.	62927	2295060
18.	15608	5	35.	1099	200210510
19.	129725	66	36.	476 dollars.	
20.	144927	36	37.	395 acres.	
21.	14703	55	38.	763 dollars.	
22.	1919	55	39.	345 bushels each	
23.	912	30	40.	389 dollars.	
24.	3502319	714	41.	1234 men.	
25.	26080418	234	42.	65381279 dollars.	
26.	11058232	277			

2. (ART. 55, p. 54.)	30613	5.	7901
3.	1469	6.	182
4.	7546	7.	264

3. (ART. 56, p. 55.)	54	5.	77
4.	20	6.	405

	Quotients.	Rem.		Quotients.	Rem.
2. (ART. 57, p. 56.)	689	2	4.	24	815
3.	43	75	5.	9876	54321123



(ART. 59, p. 57.)			Quotients.		Rem.
	Quotients.	Rem.			
2.	44	74	7.	3491706185	306787
3.	332	192	8.	948266	411328000
4.	667	253	9.	20729	5115000
5.	1473	2597	10.	18191	618562300
6.	102	497654325	11.	85	44916000000

## CONTRACTIONS IN MULTIPLICATION.

	(ART. 61, p. 62.)	3.	14197467925
2.	1914741450	4.	3086419725
	(ART. 62, p. 62.)	3.	29037739400
2.	11892984700	4.	19454930400
	(ART. 63, p. 62.)	3.	154320875
2.	995665625	4.	381232750
	(ART. 64, p. 63.)	3.	876542123457
2.	1233332433	4.	999998000001

## CONTRACTIONS IN DIVISION.

2.	(ART. 65, p. 63.)	395061	4.	35999 $\frac{88}{100}$
3.		55157		
	(ART. 66, p. 64.)		4.	143686 $\frac{8}{100}$
2.		29629629 $\frac{83}{100}$	5.	2690 $\frac{28}{100}$
3.		261371 $\frac{34}{100}$	6.	535 $\frac{82}{100}$
2.	(ART. 67, p. 64.)	13825	5.	3917 $\frac{184}{1000}$
3.		3830106	6.	6689 $\frac{472}{1000}$
4.		4729879		

## MISCELLANEOUS EXAMPLES.

1.	(p. 65.)	584 dollars.	4.	1530 cents.
2.	-	25088 dollars.	5.	873 dollars.
3.		940 cents.	6.	4257 cents.

7.	2106 miles.	27.	25
8.	61 miles.	28.	135442
9.	35405 dollars.	29.	144 feet.
10.	42884 dollars.	30.	123040 rods.
11.	7665 dollars.	31.	630 dollars.
12.	37 dollars.	32.	187 dollars.
13.	47 dollars.	33.	1188 dollars.
14.	1368 hours.	34.	413 dollars.
15.	5904 ounces.	35.	5430 dollars.
16.	56960 acres.	36.	457 dollars.
17.	234 dollars.	37.	Loss, 3 dollars.
18.	3178 dollars.	38.	Gain, 22 dollars.
19.	7581 dollars.	39.	The land, by 5136 dollars.
20.	Gain, 1488 cents.	40.	543 dollars.
21.	576 dollars.	41.	635 dollars.
22.	20 dollars.	42.	743 dollars.
23.	255 dollars.	43.	1828 dollars.
24.	3520	44.	133 dollars.
25.	1607	45.	27 dollars.
26.	5676	46.	533 dollars.

## UNITED STATES MONEY.

(ART. 71, p. 71.)		5.	\$ 41.23
1.	12500 cents.	6.	15629 cents.
2.	345000 mills.	7.	16428 mills.
3.	29,7 cents.	8.	9870 mills.
4.	\$ 2.68,2		

## ADDITION.

(ART. 72, p. 72.)		10.	\$ 13.87,0
5.	\$ 4408.88,8	11.	\$ 31.64,0
6.	\$ 410.46,9	12.	\$ 21.62,0
7.	\$ 448.36,8	13.	\$ 3.42,5
8.	\$ 4713.78,6	14.	\$ 15.00,0
9.	\$ 31.61,0	15.	\$ 48.32,0
		16.	\$ 48.48,0

## SUBTRACTION.

5. (ART. 73, p. 73.)	\$ 52.66,4	10.	\$ 82.83,0
6.	\$ 71.97,6	11.	\$ 26.58,0
7.	\$ 724.89,8	12.	\$ 9.99,1
8.	\$ 782.20,6	13.	\$ 14.74,0
9.	\$ 65.98,0	14.	\$ 34.67,1

## MULTIPLICATION.

3. (ART. 74, p. 74.)	\$ 44.55,0	9.	\$ 672.01
4.	\$ 414.64,0	10.	\$ 106.97
5.	\$ 7.31,0	11.	\$ 450.00
6.	\$ 30.87,5	12.	\$ 1600.50
7.	\$ 1774.25,0	13.	\$ 24327.96
8.	\$ 85.50		

## DIVISION.

3. (ART. 75, p. 75.)	\$ 137.37	9.	\$ 0.93
4.	\$ 5.63	10.	\$ 3.28
5.	\$ 20.00	11.	\$ 11.67
6.	\$ 0.59	12.	\$ 4.68
7.	\$ 5.68	13.	\$ 132.55
8.	\$ 0.13	14.	\$ 5.75

## PRACTICAL QUESTIONS BY ANALYSIS.

- |                      |           |    |            |
|----------------------|-----------|----|------------|
| 2. (ART. 77, p. 76.) | \$ 90.21  | 6. | \$ 68.40   |
| 3.                   | \$ 29.70  | 7. | \$ 5525.28 |
| 4.                   | \$ 42.21  | 8. | \$ 737.64  |
| 5.                   | \$ 728.19 |    |            |
10. (ART. 78, p. 77.)  $\$ 422.50 \div 65 = \$ 6.50$ ;  $\$ 650 \times 15 = \$ 97.50$  Ans.
11.  $\$ 2025 \div 45 = \$ 45$ ;  $\$ 45 \times 180 = \$ 8100$  Ans.
12.  $\$ 3.45 \div 5 = \$ 0.69$ ;  $\$ 0.69 \times 11 = \$ 7.59$  Ans.
13.  $\$ 214.50 \div 11 = \$ 19.50$ ;  $\$ 19.50 \times 87 = \$ 1696.50$  Ans.
14.  $\$ 60.00 \div 8 = \$ 7.50$ ;  $\$ 7.50 \times 87 = \$ 652.50$  Ans.
15.  $\$ 5.58 \div 9 = \$ 0.62$ ;  $\$ 0.62 \times 43 = \$ 26.66$  Ans.
16.  $\$ 85 \div 5 = \$ 17$ ;  $\$ 17 \times 97 = \$ 1649$  Ans.

17.  $\$ 3.80 \div 20 = \$ 0.19$ ;  $\$ 0.19 \times 59 = \$ 11.21$  Ans.  
 18.  $\$ 472.50 \div 27 = \$ 17.50$ ;  $\$ 17.50 \times 12 = \$ 210$  Ans.  
 19.  $\$ 39.69 \div 7 = \$ 5.67$ ;  $\$ 5.67 \times 57 = \$ 323.19$  Ans.  
 20.  $\$ 10.08 \div 144 = \$ 0.07$ ;  $\$ 0.07 \times 359 = \$ 25.13$  Ans.  
 21.  $\$ 77.13 \div 857 = \$ 0.09$ ;  $\$ 0.09 \times 359 = \$ 32.31$  Ans.  
 22.  $\$ 187.53 \div 987 = \$ 0.19$ ;  $\$ 0.19 \times 329 = \$ 62.51$  Ans.  
 23.  $\$ 26.32 \div 47 = \$ 0.56$ ;  $\$ 0.56 \times 39 = \$ 21.84$  Ans.
25. (ART. 79, p. 78.)  $175 \div 5 = 35$  reams, Ans.  
 26.  $217.50 \div 7.50 = 29$  barrels, Ans.  
 27.  $4875 \div 75 = 65$  tons, Ans.  
 28.  $1728 \div 4 = 432$  yards, Ans.  
 29.  $9.66 \div 0.69 = 14$  hundred weight, Ans.  
 30.  $66.51 \div 7.39 = 9$  barrels, Ans.  
 31.  $136.50 \div 3.25 = 42$  cords, Ans.

BILLS.

(ART. 80, p. 79.)

(1.) J. Smith.	(2.) L. Webster.
$\$ 0.75 \times 82 = \$ 61.50$	$\$ 0.18 \times 6 = \$ 1.08$
$0.92 \times 89 = 81.88$	$0.20 \times 12 = 2.40$
$0.50 \times 24 = 12.00$	$1.80 \times 6 = 10.80$
<hr/>	$0.26 \times 30 = 7.80$
$\$ 155.38$	<hr/>
	$\$ 22.08$
(3.) W. Greenleaf.	(4.) A. Dow.
$\$ 0.50 \times 86 = \$ 43.00$	$\$ 23.75 \times 37 = \$ 878.75$
$0.86 \times 90 = 77.40$	$17.50 \times 42 = 735.00$
$11.00 \times 18 = 198.00$	$99.00 \times 43 = 4257.00$
$3.50 \times 23 = 80.50$	$175.00 \times 12 = 2100.00$
$0.62 \times 14 = 8.68$	$7.00 \times 19 = 133.00$
$12.12 \times 12 = 145.44$	$1.52 \times 23 = 34.96$
$12.00 \times 46 = 552.00$	<hr/>
<hr/>	$\$ 8138.71$
$\$ 1105.02$	

(5.) Dr. John Wade	To	Ayer, Fitts, & Co. Cr.
\$ 1.20 $\times$ 80 =	\$ 96.00	\$ 0.20 $\times$ 27 = \$ 5.40
3.00 $\times$ 17 =	51.00	3.90 $\times$ 10 = 39.00
1.08 $\times$ 19 =	20.52	4.75 $\times$ 7 = 33.25
0.75 $\times$ 23 =	17.25	2.93 $\times$ 19 = 55.67
	<u>          </u>	0.37 $\times$ 20 = 7.40
	\$ 184.77	<u>          </u>
		\$ 140.72

\$ 184.77

140.72

Balance due, \$ 44.05

(ART. 81, p. 81.)

1. \$ 254.27

3. \$ 1995.52

2. \$ 338.36

4. \$ 19411.14

## REDUCTION.

(ART. 86, p. 84.)

(3.)  
 9£. 18s. 7d.  
20  
 198s.  
12  
 2383d. Ans.

(4.)  
 12)2383d.  
 20)198s. 7d.  
 Ans. 9£. 18s. 7d.

(5.)  
 14£. 11s. 5d. 2far.  
20  
 291s.  
12  
 3497d.  
4  
 13990far. Ans.

(6.)  
 4)13990far.  
 12)3497d. 2far.  
 20)291s. 5d.  
 Ans. 14£. 11s. 5d. 2far.

(ART. 87, p. 86.)

$$\begin{array}{r}
 (3.) \\
 76\text{pwt. } 12\text{gr.} \\
 \underline{24} \\
 306 \\
 \underline{153} \\
 \text{Ans. } 1836\text{gr.}
 \end{array}$$

$$\begin{array}{r}
 (4.) \\
 24)1836\text{gr.} \\
 \underline{\hspace{1cm}} \\
 \text{Ans. } 76\text{pwt. } 12\text{gr.}
 \end{array}$$

$$\begin{array}{r}
 (5.) \\
 76\text{lb. } 5\text{oz.} \\
 \underline{12} \\
 917\text{oz.} \\
 \underline{20} \\
 18340\text{pwt.} \\
 \underline{24} \\
 \text{Ans. } 440160\text{gr.}
 \end{array}$$

$$\begin{array}{r}
 (6.) \\
 24)440160\text{gr.} \\
 \underline{20)18340\text{pwt.}} \\
 12)917\text{oz.} \\
 \text{Ans. } 76\text{lb. } 5\text{oz.}
 \end{array}$$

$$\begin{array}{r}
 (7.) \\
 144\text{lb. } 9\text{oz.} \\
 \underline{12} \\
 1737\text{oz.} \\
 \underline{20} \\
 \text{Ans. } 34740\text{pwt.}
 \end{array}$$

$$\begin{array}{r}
 (8.) \\
 20)34740\text{pwt.} \\
 \underline{12)1737\text{oz.}} \\
 \text{Ans. } 144\text{lb. } 9\text{oz.}
 \end{array}$$

$$\begin{array}{r}
 (9.) \\
 24)17895\text{gr.} \\
 \underline{20)745\text{pwt. } 15\text{gr.}} \\
 12)37\text{oz. } 5\text{pwt.} \\
 \text{Ans. } 3\text{lb. } 1\text{oz.} \\
 [5\text{pwt. } 15\text{gr.}]
 \end{array}$$

$$\begin{array}{r}
 (10.) \\
 3\text{lb. } 1\text{oz. } 5\text{pwt. } 15\text{gr.} \\
 \underline{12} \\
 37\text{oz.} \\
 \underline{20} \\
 745\text{pwt.} \\
 \underline{24} \\
 \text{Ans. } 17895\text{gr.}
 \end{array}$$

$$\begin{array}{r}
 (11.) \\
 2\text{oz. } 18\text{pwt. } 12\text{gr.} \\
 \underline{20} \\
 58\text{pwt.} \\
 \underline{24} \\
 1404\text{gr.} \\
 \underline{1.87} \\
 \text{Ans. } \$1923.48
 \end{array}$$

(ART. 88, p. 87.)

$$\begin{array}{r}
 (3.) \\
 76\text{lb} \\
 \underline{12} \\
 912\text{z} \\
 \underline{8} \\
 7296\text{z} \\
 \underline{3} \\
 21888\text{D} \text{ Ans.}
 \end{array}$$

$$\begin{array}{r}
 (4.) \\
 3)21888\text{D} \\
 \underline{8)7296\text{z}} \\
 12)912\text{z} \\
 \text{Ans. } 76\text{lb}
 \end{array}$$

$$\begin{array}{r}
 (5.) \\
 144\text{lb} \\
 \underline{12} \\
 1728\text{z} \\
 \underline{8} \\
 13824\text{z} \\
 \underline{3} \\
 41472\text{D} \\
 \underline{20}
 \end{array}$$

$$\begin{array}{r}
 (6.) \\
 20)829440\text{gr.} \\
 \underline{3)41472\text{D}} \\
 8)13824\text{z} \\
 12)1728\text{z} \\
 \text{Ans. } 144\text{lb}
 \end{array}$$

$$\begin{array}{r}
 \text{Ans. } 829440\text{gr.}
 \end{array}$$

<p>(7.)</p> $  \begin{array}{r}  12\overline{\text{H}}\ 8\frac{2}{3}\ 3\frac{1}{3}\ 1\overline{\text{D}}\ 18\text{gr.} \\  \underline{12} \\  152\frac{2}{3} \\  \underline{8} \\  1219\frac{2}{3} \\  \underline{3} \\  3658\overline{\text{D}} \\  \underline{20} \\  73178\text{gr. Ans.}  \end{array}  $	<p>(8.)</p> $  \begin{array}{r}  20\overline{73178}\text{gr.} \\  \underline{8)3658\overline{\text{D}}}\ 18\text{gr.} \\  \underline{8)1219\frac{2}{3}}\ 1\overline{\text{D}} \\  \underline{12)152\frac{2}{3}}\ 3\frac{1}{3} \\  \text{Ans. } 12\overline{\text{H}}\ 8\frac{2}{3} \\  \quad [3\frac{1}{3}\ 1\overline{\text{D}}\ 18\text{gr.}  \end{array}  $	<p>(9.)</p> $  \begin{array}{r}  7\frac{2}{3}\ 6\frac{1}{3}\ 2\overline{\text{D}} \\  \underline{8} \\  62\frac{2}{3} \\  \underline{8} \\  \text{Ans. } 188\ \text{doses.}  \end{array}  $
--	--	---

(ART. 89, p. 89.)

<p>(3.) 16T. 19cwt. 0qr. 10lb. 11oz. 5dr.</p> $  \begin{array}{r}  \underline{20} \\  339 \\  \underline{4} \\  1356 \\  \underline{25} \\  6780 \\  \underline{2713} \\  33910 \\  \underline{16} \\  203461 \\  \underline{33911} \\  542571 \\  \underline{16} \\  3255431 \\  \underline{542571} \\  8681141  \end{array}  $	<p>(4.) 16)8681141dr.</p> $  \begin{array}{r}  \underline{16)542571}\text{oz. 5dr.} \\  \underline{25)33910}\text{lb. 11oz.} \\  \underline{4)1356}\text{qr. 10lb.} \\  \underline{20)339}\text{cwt. 0qr.} \\  \quad 16\text{T. 19cwt. 0qr. 10lb. 11oz. 5dr.}  \end{array}  $	<p>(5.) 679cwt. (6.) 25)67900lb.</p> $  \begin{array}{r}  \underline{4} \\  2716\text{qr.} \\  \underline{25} \\  13580 \\  \underline{5432} \\  67900\text{lb. Ans.}  \end{array}  $
--	---	---

(7.)	(8.)
17cwt. 0qr. 18lb	48T. 17cwt.
<u>4</u>	<u>20</u>
71qr.	977cwt.
<u>25</u>	<u>4</u>
363	3908qr.
<u>143</u>	<u>25</u>
1793lb.	19540
<u>.07</u>	<u>7816</u>
\$125.51 Ans.	97700lb.
	<u>.08</u>
	\$7816.00 Ans.

(ART. 90, p. 90.)

(3.)	(4.)	(5.)
144yd. 3qr.	4)579qr.	17 E. E. 4qr. 3na.
<u>4</u>	Ans. 144yd. 3qr.	<u>5</u>
Ans. 579qr.		89qr.
		<u>4</u>
		Ans. 359na.
(6.)	(7.)	(8.)
4)359na.	126yd. 0qr. 3na.	4)2019na.
<u>5</u> 89qr. 3na.	<u>4</u>	<u>4</u> 504qr. 3na.
Ans. 17 E. E. 4qr. 3na.	504qr.	Ans. 126yd. 0qr. 3na.
	<u>4</u>	
	Ans. 2019na.	



$$\begin{array}{r}
 (9.) \\
 49\text{yd. } 3\text{qr.} \\
 \underline{4} \\
 199\text{qr.} \\
 2.17 \\
 \hline
 \text{Ans. \$ } 481.83
 \end{array}$$

$$\begin{array}{r}
 (10.) \\
 144\text{yd. } 1\text{qr. } 3\text{na.} \\
 \underline{4} \\
 577\text{qr.} \\
 \underline{4} \\
 2311\text{na.} \\
 \underline{.25}
 \end{array}$$

Ans. \$ 577.75

$$\begin{array}{r}
 (3.) \\
 47\text{m.} \\
 \underline{8} \\
 376\text{fur.} \\
 \underline{40} \\
 15040\text{rd.} \\
 \underline{16\frac{1}{2}}
 \end{array}$$

Ans. 248160ft.

(5.) 78deg. 50m. 7fu. 30rd. 5yd. 2ft. 10in.

$$\begin{array}{r}
 69\frac{1}{8} \\
 \underline{752} \\
 468 \\
 \underline{13} \\
 5445 \\
 \underline{8} \\
 43567 \\
 \underline{40} \\
 1742710 \\
 \underline{5\frac{1}{2}} \\
 8713555 \\
 \underline{871355} \\
 9584910 \\
 \underline{8} \\
 28754732 \\
 \underline{12} \\
 845056794
 \end{array}$$

(ART. 91, p. 92.)

$$\begin{array}{r}
 (4.) \\
 16\frac{1}{2})248160\text{ft.} \\
 \underline{40}15040\text{rd.} \\
 \underline{8}376\text{fur.} \\
 \text{Ans. } 47\text{m.}
 \end{array}$$

(6.)

12)345056794in.

8)28754732ft. 10in.

5\frac{1}{2})9584910yd. 2ft.

40)1742710rd. 5yd.

8)43567fur. 30rd.

69\frac{1}{8})5445m. 7fur.

78deg. 50m. 7fur. 30rd. 5yd.

[2ft. 10in.]

(ART. 92, p. 93.)

(3.)	(4.)	(5.)
80)4386cha.	54m. 66cha.	75m. 49cha.
Ans. 54m. 66cha.	80	80
	Ans. 4386cha.	6049cha.
		4
(6.)	(7.)	Ans. 24196 poles.
4)24196 poles.	7m. 4fur. 30rd.	
80)6049cha.	8	(8.)
Ans. 75m. 49cha.	60fur.	25)60750l.
	40	40)2430rd.
	2430rd.	8)60fur. 30rd.
	25	Ans. 7m. 4fur. 30rd.
	Ans. 60750l.	

(ART. 93, p. 96.)

(3.)	(4.)
49A. 3R. 16p.	272½)2171466ft.
4	40)7976p.
199R.	4)199R. 16p.
40	Ans. 49A. 3R. 16p.
7976p.	
272½	
Ans. 2171466ft.	
(5.)	(6.)
365A. 3R. 17p.	3A. 1R. 30p.
4	4
1463R.	13R.
40	40
58537p.	550p.
1.75	272½
Ans. \$ 102,439.75	149737½ft.
	1.25
	Ans. \$ 187171.87,5

(7.)	(8.)	(9.)
12m.	18A. 0R. 16p.	48A. 3R. 14p.
<u>12</u>	<u>4</u>	<u>4</u>
144 sq. m.	72R.	195R.      \$ 3.15
<u>640</u>	<u>40</u>	<u>40</u> 2.25
Ans. 92160A.	2896p.	7814p.      .90
	272½	<u>.90</u>
	Ans. 788436 sq. ft.	Ans. \$ 7032.60

(ART. 94, p. 98.)

(3.)	(4.)	(5.)
45C.	1728)9953280 cu. in.	15ft.
<u>128</u>	<u>128)5760ft.</u>	<u>4</u>
5760ft.	Ans. 45C.	60
<u>1728</u>		<u>6½</u>
9953280 cu. in., Ans.		128)390 cu. ft.
		Ans. 3C. 6ft.

(6.)	(7.)	(8.)
4ft.	14	40)9080ft.
<u>8½</u>	<u>12</u>	<u>227</u>
13	168	11.50
<u>2</u>	<u>8</u>	\$ 2610.50
26 cu. ft.	Ans. 1344 cu. ft.	
<u>1728</u>		
Ans. 44928 cu. in.		

(ART. 95, p. 99.)

(3.)	
197 tuns 3hhd. 60gal. 3qt. 1pt.	
<u>4</u>	
791hhd.	(4.)
<u>63</u>	4)1596604gi.
49893gal.	2)399151pt.
<u>4</u>	4)199575qt. 1pt.
199575qt.	63)49893gal. 3qt.
<u>2</u>	4)791hhd. 60gal.
399151pt.	Ans. 197 tuns 3hhd. 60gal.
<u>4</u>	[3qt. 1pt.
Ans. 1596604gi.	

(5.)	(6.)
7	18 tuns 1hhd. 47gal.
<u>63</u>	<u>4</u>
441gal.	73hhd.
<u>4</u>	<u>63</u>
1764qt.	4646gal.
<u>2</u>	<u>1.25</u>
3528pt.	Ans. \$ 5807.50
<u>.05</u>	
Ans. \$ 176.40	

(ART. 96, p. 100.)

(3.)		(5.)	(6.)
4 tuns 1hhd. 17gal. 0qt. 1pt.		7hhd. 18gal.	18
<u>4</u>		<u>54</u>	<u>54</u>
17hhd.	(4.)	396gal.	972gal.
<u>54</u>	2)7481pt.	<u>4</u>	<u>.15</u>
935gal.	4)3740qt. 1pt.	1584qt.	Ans. \$145.80
<u>4</u>	54)935gal.	<u>.04</u>	
3740qt.	4)17hhd. 17gal.	\$63.36 Ans.	
<u>2</u>			
7481pt. Ans.	Ans. 4 tuns 1hhd. 17gal. 0qt. 1pt.		

(ART. 97, p. 101.)

$$\begin{array}{r}
 (3.) \\
 97\text{ch. } 30\text{bu. } 2\text{pk.} \\
 \underline{36} \\
 3522\text{bu.} \\
 \underline{4} \\
 14090\text{pk.} \\
 \underline{8} \\
 112720\text{qt. Ans.}
 \end{array}$$

$$\begin{array}{r}
 (5.) \\
 35\text{bu. } 0\text{pk. } 0\text{qt. } 1\text{pt.} \\
 \underline{4} \\
 140\text{pk.} \\
 \underline{8} \\
 1120\text{qt.} \\
 \underline{2} \\
 2241\text{pt. Ans.}
 \end{array}$$

$$\begin{array}{r}
 (4.) \\
 8)112720\text{qt.} \\
 \underline{4)14090\text{pk.}} \\
 36)3522\text{bu. } 2\text{pk.} \\
 \text{Ans. } 97\text{ch. } 30\text{bu.} \\
 [2\text{pk.}
 \end{array}$$

$$\begin{array}{r}
 (6.) \\
 2)2241\text{pt.} \\
 8)1120\text{qt. } 1\text{pt.} \\
 \underline{4)140\text{pk.}} \\
 \text{Ans. } 35\text{bu. } 0\text{pk. } 0\text{qt. } 1\text{pt.}
 \end{array}$$

$$\begin{array}{r}
 (7.) \\
 18\text{qr. } 0\text{bu. } 3\text{pk. } 5\text{qt.} \\
 \underline{8} \\
 144\text{bu.} \\
 \underline{4} \\
 579\text{pk.} \\
 \underline{8} \\
 \text{Ans. } 4637\text{qt.}
 \end{array}$$

$$\begin{array}{r}
 (8.) \\
 8)4637\text{qt.} \\
 \underline{4)579\text{pk. } 5\text{ qt.}} \\
 8)144\text{bu. } 3\text{pk.} \\
 \text{Ans. } 18\text{qr. } 0\text{bu. } 3\text{pk.} \\
 [5\text{qt.}
 \end{array}$$

$$\begin{array}{r}
 (9.) \\
 19\text{bu. } 3\text{pk. } 7\text{qt. } 1\text{pt.} \\
 \underline{4} \\
 79\text{pk.} \\
 \underline{8} \\
 639\text{qt.} \\
 \underline{2} \\
 \text{Ans. } 1279\text{pt.}
 \end{array}$$

$$\begin{array}{r}
 (10.) \\
 2)1279\text{pt.} \\
 8)639\text{qt. } 1\text{pt.} \\
 \underline{4)79\text{pk. } 7\text{qt.}} \\
 \text{Ans. } 19\text{bu. } 3\text{pk. } 7\text{qt. } 1\text{pt.}
 \end{array}$$

(ART. 98, p. 104.)

$$\begin{array}{r}
 (3.) \\
 296\text{da. } 18\text{h. } 32\text{m.} \\
 \underline{24} \\
 7122\text{h.} \\
 \underline{60} \\
 \text{Ans. } 427352\text{m.}
 \end{array}$$

$$\begin{array}{r}
 (4.) \\
 60)427352\text{m.} \\
 \underline{24)7122\text{h. } 32\text{m.}} \\
 \text{Ans. } 296\text{da. } 18\text{h. } 32\text{m.}
 \end{array}$$

(5.)

$  \begin{array}{r}  365\text{da. } 5\text{h. } 48\text{m. } 49\text{sec.} \\  \underline{24} \\  8765\text{h.} \\  \underline{60} \\  525948\text{m.} \\  \underline{60} \\  31556929\text{sec.} \\  \underline{30 \text{ years.}} \\  946707870 \\  \underline{22699722\text{sec.}} \\  \text{Ans. } 969407592\text{sec.}  \end{array}  $	$  \begin{array}{r}  262\text{da. } 17\text{h. } 28\text{m. } 42\text{sec.} \\  \underline{24} \\  6305\text{h.} \\  \underline{60} \\  378328\text{m.} \\  \underline{60} \\  22699722\text{sec.}  \end{array}  $
---	--

(6.)

$  \begin{array}{r}  365\text{da. } 5\text{h. } 48\text{m. } 49\text{sec.} \\  \underline{24} \\  8765\text{h.} \\  \underline{60} \\  525948\text{m.} \\  \underline{60} \\  31556929 \text{ seconds in a solar year.}  \end{array}  $	$  \begin{array}{r}  31556929)969407832(30 \text{ years.} \\  \underline{946707870} \\  60)22699722\text{sec.} \\  \underline{60)378328\text{m. } 42\text{sec.}} \\  24)6305\text{h. } 28\text{m.} \\  \underline{262\text{da. } 17\text{h.}} \\  \text{Ans. } 30\text{y. } 262\text{da. } 17\text{h. } 28\text{m. } 42\text{sec}  \end{array}  $
---	---

(7.)

$$\begin{array}{r}
 60)684592\text{m.} \\
 \underline{24)11409\text{h. } 52\text{m.}} \\
 \underline{7)475\text{d. } 9\text{h.}} \\
 \text{Ans. } 67\text{w. } 6\text{d. } 9\text{h. } 52\text{m.}
 \end{array}$$

(8.)

$$\begin{array}{r}
 67\text{w. } 6\text{d. } 9\text{h. } 52\text{m.} \\
 \underline{7} \\
 475\text{da.} \\
 \underline{24} \\
 11409\text{h.} \\
 \underline{60} \\
 \text{Ans. } 684592\text{m.}
 \end{array}$$

9.	189 days.	12.	275 days.
10.	425 days.	13.	366 days.
11.	43 days.	14.	1213 days.

(ART. 99, p. 106.)

(3.)	(4.)
27S. 19° 51' 28"	60)2987488"
30	60)49791' 28"
829°	30)829° 51'
60	Ans. 27S. 19° 51' 28"
49791'	
60	
Ans. 2987488"	

## MISCELLANEOUS EXERCISES.

1. (p. 107.)  $\$ 345 \times 100 = 34500$ ;  $34500 \div 18 = 34518$ ,  
 $34518 \times 10 = 345180$  mills, Ans.
2.  $345180 \text{ mills} \div 10 = 34518$ ;  $34518 \div 100 = \$ 345.18$ ,  
 Ans.
3.  $46\text{£.} \times 20 = 920\text{s.}$ ;  $920\text{s.} + 18\text{s.} = 938\text{s.}$ ;  $938\text{s.} \times 12 =$   
 $11256\text{d.}$ ;  $11256\text{d.} + 5\text{d.} = 11261\text{d.}$ ;  $11261\text{d.} \times 4 =$   
 $45044\text{far.}$  Ans.
4.  $45044\text{far.} \div 4 = 11261\text{d.}$ ;  $11261\text{d.} \div 12 = 938\text{s. } 5\text{d.}$ ;  $938\text{s.}$   
 $\div 20 = 46\text{£. } 18\text{s. } 5\text{d.}$  Ans.
5.  $61\text{lb.} \times 12 = 732\text{oz.}$ ;  $732\text{oz.} \times 20 = 14640 \text{ pwt.}$ ;  $14640$   
 $\text{pwt.} + 17\text{pwt.} = 14657\text{pwt.}$ ;  $14657\text{pwt.} \times 24 = 351768\text{gr.}$ ;  
 $351768\text{gr.} + 17\text{gr.} = 351785 \text{ gr.}$  Ans.
6.  $351785\text{gr.} \div 24 = 14657\text{pwt. } 17\text{gr.}$ ;  $14657\text{pwt.} \div 20 =$   
 $732\text{oz. } 17\text{pwt.}$ ;  $732\text{oz.} \div 12 = 61\text{lb. } 0\text{oz. } 17\text{pwt. } 17\text{gr.}$   
 Ans.
7.  $27\text{£} \times 12 = 324\text{£}$ ;  $324\text{£} + 3\text{£} = 327\text{£}$ ;  $327\text{£} \times 8 =$   
 $2616\text{£}$ ;  $2616\text{£} + 1\text{£} = 2617\text{£}$ ;  $2617\text{£} \times 3 = 7851\text{£}$ ;  
 $7851\text{£} + 1\text{£} = 7852\text{£}$  Ans.
8.  $7852\text{£} \div 3 = 2617\text{£ } 1\text{£}$ ;  $2617\text{£} \div 8 = 327\text{£ } 1\text{£}$ ;  $327\text{£}$   
 $\div 12 = 27\text{£ } 3\text{£ } 1\text{£}$  Ans.
9.  $83\text{T.} \times 20 = 1660\text{cwt.}$ ;  $1660\text{cwt.} + 11\text{cwt.} = 1671\text{cwt.}$ ;  
 $1671\text{cwt.} \times 4 = 6684\text{qr.}$ ;  $6684\text{qr.} + 3\text{qr.} = 6687\text{qr.}$ ;  
 $6687\text{qr.} \times 25 = 167175\text{lb.}$ ;  $167175\text{lb.} + 18\text{lb.} =$   
 $167193\text{lb.}$ ;  $167193\text{lb.} \times 16 = 2675088\text{oz.}$  Ans.

10.  $2675088\text{oz.} \div 16 = 167193\text{lb.}$ ;  $167193\text{lb.} \div 25 = 6687\text{qr.}$   
 $18\text{lb.}$ ;  $6687\text{qr.} \div 4 = 1671\text{cwt.}$   $3\text{qr.}$ ;  $1671\text{cwt.} \div 20 =$   
 $83\text{T.}$   $11\text{cwt.}$   $3\text{qr.}$   $18\text{lb.}$  Ans.
11.  $97\text{yd.} \times 4 = 388\text{qr.}$ ;  $388\text{qr.} + 3\text{qr.} = 391\text{qr.}$ ;  $391\text{qr.} \times$   
 $4 = 1564\text{na.}$ ;  $1564\text{na.} + 3\text{na.} = 1567\text{na.}$  Ans.
12.  $1567\text{na.} \div 4 = 391\text{qr.}$   $3\text{na.}$ ;  $391\text{qr.} \div 4 = 97\text{yd.}$   $3\text{qr.}$   $3\text{na.}$  Ans.
13.  $57\text{E. E.} \times 5 = 285\text{qr.}$ ;  $285\text{qr.} \div 4 = 71\text{yd.}$   $1\text{qr.}$  Ans.
14.  $71\text{yd.} \times 4 = 284\text{qr.}$ ;  $284\text{qr.} + 1\text{qr.} = 285\text{qr.}$ ;  $285\text{qr.} \div$   
 $5 = 57\text{E. E.}$  Ans.
15.  $15\text{m.} \times 8 = 120\text{fur.}$ ;  $120\text{fur.} + 7\text{fur.} = 127\text{fur.}$ ;  $127\text{fur.}$   
 $\times 40 = 5080\text{rd.}$ ;  $5080\text{rd.} + 18\text{rd.} = 5098\text{rd.}$ ;  $5098\text{rd.} \times$   
 $16\frac{1}{2} = 84117\text{ft.}$ ;  $84117\text{ft.} + 10\text{ft.} = 84127\text{ft.}$ ;  $84127\text{ft.} \times$   
 $12 = 1009524\text{in.}$ ;  $1009524\text{in.} + 6\text{in.} = 1009530\text{in.}$  Ans.
16.  $1009530\text{in.} \div 12 = 84127\text{ft.}$   $6\text{in.}$ ;  $84127\text{ft.} \div 16\frac{1}{2} = 5098\text{rd.}$   
 $10\text{ft.}$ ;  $5098\text{rd.} \div 40 = 127\text{fur.}$   $18\text{rd.}$ ;  $127\text{fur.} \div 8 = 15\text{m.}$   
 $7\text{fur.}$   $18\text{rd.}$   $10\text{ft.}$   $6\text{in.}$  Ans.
17.  $95,000,000\text{ miles} \times 8 = 760000000\text{ furlongs}$ ;  $760000000$   
 $\text{furlongs} \times 40 = 30400000000\text{ rods}$ ;  $30400000000\text{ rods}$   
 $\times 16\frac{1}{2} = 501600000000\text{ feet}$ ;  $501600000000\text{ feet} \times 12$   
 $= 6,019,200,000,000\text{ inches,}$  Ans.
18.  $6,019,200,000,000\text{in.} \div 12 = 501600000000\text{ft.}$ ;  $501600000000\text{ft.} \div 16\frac{1}{2} =$   
 $30400000000\text{rd.}$ ;  $30400000000\text{rd.} \div 40 = 760000000\text{fur.}$ ;  $760000000\text{fur.} \div 8 = 95,000,000$   
 $\text{miles,}$  Ans.
19.  $48\text{deg.} \times 69\frac{1}{2} = 3320\text{m.}$ ;  $3320\text{m.} + 18\text{m.} = 3338\text{m.}$ ;  $3338\text{m.}$   
 $\times 8 = 26704\text{fur.}$ ;  $26704\text{fur.} + 7\text{fur.} = 26711\text{fur.}$ ;  $26711\text{fur.}$   
 $\times 40 = 1068440\text{rd.}$ ;  $1068440\text{rd.} + 18\text{rd.} = 1068458\text{rd.}$   
 $\times 16\frac{1}{2} = 17629557\text{ft.}$  Ans.
20.  $16\frac{1}{2})17629557\text{ft.}$   
 $40)1068458\text{rd.}$   
 $8)26711\text{fur.}$   $18\text{rd.}$   
 $69\frac{1}{2})3338\text{m.}$   $7\text{fur.}$   
 $48\text{deg.}$   $18\text{m.}$   $7\text{fur.}$   $18\text{rd.}$  Ans.
21.  $7\text{A.} \times 4 = 28\text{R.}$ ;  $28\text{R.} + 3\text{R.} = 31\text{R.}$ ;  $31\text{R.} \times 40 =$   
 $3$



- $1240p. ; 1240p. + 16p. = 1256p. ; 1256p. \times 272\frac{1}{4} = 341946ft. ; 341946ft. + 218ft. = 342164ft. \text{ Ans.}$   
 22.  $342164ft. \div 272\frac{1}{4} = 1256p. 218ft. ; 1256p. \div 40 = 31R. 16p. ; 31R. \div 4 = 7A. 3R. 16p. 218ft. \text{ Ans.}$   
 23.  $25 S. M. \times 640 = 16000A. ; 16000A. \times 160 = 2560000p. ; 2560000p. \times 272\frac{1}{4} = 696960000ft. ; 696960000ft. \times 144 = 100362240000in. \text{ Ans.}$   
 24.  $100362240000in. \div 144 = 696960000ft. ; 696960000ft. \div 272\frac{1}{4} = 2560000p. ; 2560000p. \div 160 = 16000A. ; 16000A. \div 640 = 25 \text{ square miles, Ans.}$   
 25.  $15T. \times 40 = 600ft. ; 600ft. \times 1728 = 1036800in. \text{ Ans.}$   
 26.  $1036800in. \div 1728 = 600ft. ; 600ft. \div 40 = 15T. \text{ Ans.}$   
 27.  $5hhd. \times 63 = 315gal. ; 315gal. + 17gal. = 332gal. ; 332gal. \times 4 = 1328qt. ; 1328qt. + 3qt. = 1331qt. ; 1331qt. \times 2 = 2662pt. ; 2662pt. \times 4 = 10648 \text{ gills, Ans.}$   
 28.  $10648gi. \div 4 = 2662pt. ; 2662pt. \div 2 = 1331qt. ; 1331qt. \div 4 = 332gal. 3qt. ; 332gal. \div 63 = 5hhd. 17gal. 3qt. \text{ Ans.}$   
 29.  $29hhd. \times 54 = 1566gal. ; 1566gal. + 30gal. = 1596gal. ; 1596gal. \times 4 = 6384qt. ; 6384qt. + 3qt. = 6387qt. \text{ Ans.}$   
 30.  $6387qt. \div 4 = 1596gal. 3qt. ; 1596gal. \div 54 = 29hhd. 30gal. 3qt. \text{ Ans.}$   
 31.  $15ch. \times 36 = 540bu. ; 540bu. + 16bu. = 556bu. ; 556bu. \times 4 = 2224pk. ; 2224pk. + 3pk. = 2227pk. ; 2227pk. \times 8 = 17816qt. ; 17816qt. \times 2 = 35632pt. \text{ Ans.}$   
 32.  $35632pt. \div 2 = 17816qt. ; 17816qt. \div 8 = 2227pk. ; 2227pk. \div 4 = 556bu. 3pk. ; 556bu. \div 36 = 15ch. 16bu. 3pk. \text{ Ans.}$   
 33.  $365da. \times 24 = 8760h. ; 8760h. + 6h. = 8766h. ; 8766h. \times 60 = 525960m. ; 525960m. \times 60 = 31557600sec. \text{ Ans.}$   
 34.  $31557600sec. \div 60 = 525960m. ; 525960m. \div 60 = 8766h. ; 8766h. \div 24 = 365da. 6h. \text{ Ans.}$   
 35.  $365da. \times 24 = 8760h. ; 8760h. + 6h. = 8766h. ; 8766h. \times 1842 = 16146972h. \text{ Ans.}$   
 36.  $16146972h. \div 8766 = 1842 \text{ years, Ans.}$

37.  $8\text{S.} \times 30 = 240^\circ$ ;  $240^\circ + 14^\circ = 254^\circ$ ;  $254^\circ \times 60 = 15240'$ ;  $15240' + 18' = 15258'$ ;  $15258' \times 60 = 915480''$ ;  $915480'' + 17'' = 915497''$ , Ans.
38.  $915497'' \div 60 = 15258' 17''$ ;  $15258' \div 60 = 254^\circ 18'$ ;  $254^\circ \div 30 = 8\text{S. } 14^\circ 18' 17''$ , Ans.
39.  $13 \times 144 \times .02\frac{1}{2} = \$46.80$ , Ans.
40.  $12 \times 20 \times .20 = \$48.00$ , Ans.
41.  $2\text{hhd.} \times 63 \times 4 = 504\text{qt.}$ ;  $504\text{qt.} \div 3 = 168\text{ bottles}$ , Ans.
42.  $\$1480.00 \div 25 = \$59.20$ ;  $\$59.20 \div 160 = \$0.37$ , cost of 1p.; 37A. 2R. 18p. = 6018p.;  $\$0.37 \times 6018 = \$2226.66$ , Ans.
43.  $5\text{cwt. } 3\text{qr. } 18\text{lb.} = 593\text{lb.}$ ;  $593\text{lb.} \times \$0.09 = \$53.37$ ;  $\$1.75 \times 25 = \$43.75$ ;  $\$53.37 - \$43.75 = \$9.62$ , Ans.
44.  $2\text{lb. } 7\text{oz.} = 31\text{oz.}$ ;  $\$46.50 \div 31 = \$1.50$ , price per oz.;  $\$1.50 \times 12 = \$18.00$ , price per pound, Ans.
45.  $3\text{T. } 1\text{cwt. } 18\text{lb.} = 6118\text{lb.}$ ;  $6118\text{lb.} \times \$0.12 = \$734.16$ ;  $6118\text{lb.} \times \$0.09 = \$550.62$ ;  $\$734.16 - \$550.62 = \$183.54$ , Ans.
46.  $37\text{m. } 7\text{fur. } 29\text{rd.} = 12149\text{rd.}$ ;  $12149\text{rd.} \times \$5.75 = \$69856.75$ , Ans.
47.  $15\text{m. } 6\text{fur. } 37\text{rd.} = 5077\text{rd.}$ ;  $5077\text{rd.} \times \$17.29 = \$87,781.33$ , Ans.
48.  $40\text{p. } 200\text{ft.} = 11090\text{ft.}$ ;  $11090\text{ft.} \times \$1.50 = \$16,635$ , Ans.
49.  $18\text{ft.} \times 15\text{ft.} = 270\text{ sq. ft.}$ ;  $270\text{ sq. ft.} \div 9 = 30\text{yd.}$  Ans.
50.  $47\text{da.} \times 10 = 470\text{h.}$ ;  $470\text{h.} + 7\text{h.} = 477\text{h.} = 28620\text{m.}$ ;  $28620 \times 120 = 3434400\text{ nails}$ , Ans.
51.  $80\text{rd.} \times 50 = 4000\text{ sq. rd.}$ ;  $4000\text{ sq. rd.} \div 160 = 25\text{ acres}$ , Ans.
52.  $18000000 \div 90 = 200000\text{m.} = 138\text{da. } 21\text{h. } 20\text{m.}$  Ans.
53.  $9 \times 15 \times 23 = 3105\text{yd.}$ ;  $3105 \times \$0.08 = \$248.40$ , Ans.
54.  $6\text{m.} \times 4\frac{1}{2}\text{m.} = 27\text{ sq. m.}$ ;  $27\text{ sq. m.} = 17280\text{A.}$ ;  $17280 \div 90 = 192\text{ lots}$ , Ans.
55.  $196\text{d. } 49\text{m.} = 282289\text{m.}$ ;  $282289 \times 47 = 13267583\text{ times}$ , Ans.
56.  $36\text{ft.} \times 16 = 576\text{ sq. ft.}$ ;  $576\text{ sq. ft.} \times 2 = 1152\text{ sq. ft.}$ ;  $= 165888\text{in.}$ ;  $165888\text{in.} \div 27 = 6144\text{ shingles}$ , Ans.

57.  $110\text{m.} = 6969600\text{in.}$ ;  $12\text{ft. } 6\text{in.} = 150\text{in.}$ ;  $6969600 \div 150 = 46464$  times, Ans.
58.  $25 \times 7 \times 5 \times 12 \times 15 \times 178 = 28035000$ ;  $28035000 \times \$4.84 = \$135689400$ , Ans.
59.  $18 \times 5\frac{1}{2} = 99\text{yd.}$ ;  $99\text{yd.} + 5\text{yd.} = 104\text{yd.}$ ;  $104\text{yd.} \times 3 = 312\text{ft.}$ ;  $312\text{ft.} + 2\text{ft.} = 314\text{ft.}$ ;  $314\text{ft.} \times 12 = 3768\text{in.}$ ;  $3768\text{in.} + 11\text{in.} = 3779\text{in.}$  Ans.
60.  $3779\text{in.} \div 12 = 314\text{ft. } 11\text{in.}$ ;  $314\text{ft.} \div 3 = 104\text{yd. } 2\text{ft.}$ ;  $104\text{yd.} \div 5\frac{1}{2} = 18\text{rd. } 5\text{yd. } 2\text{ft. } 11\text{in.}$  Ans.
61.  $5\text{T. } 17\text{cwt. } 3\text{qr. } 18\text{lb.} = 11793\text{lb.}$ ;  $11793\text{lb.} \times \$0.03 = \$353.79$ , Ans.
62.  $25\text{rd.} \times 16 = 400 \text{ sq. rd.} = 108900 \text{ sq. ft.}$ ;  $108900 \times \$1.25 = \$136,125$ ;  $\$136,125 - \$100,000 = \$36,125$ , Ans.

### ADDITION OF COMPOUND NUMBERS.

- (ART. 101, p. 111.)
- |  |                                      |
|--|--------------------------------------|
| 3. 191lb. 1oz. 19pwt. 15gr.              | 7. 102T. 1cwt. 3qr. 9lb. 15oz. 10dr. |
| 5. 234lb 13 23 19 12gr.                  | 9. 189E.E. 0qr. 1na. 1 1/4 in.       |
| 11. 74m. 3fur. 39rd. 2 1/2 yd. 2ft. 6in. |                                      |
|  | 1/2 yd. = 1ft. 6in.                  |
| 74m. 3fur. 39rd. 3yd. 1ft. 0in.          |                                      |
| 13. 179m. 0fur. 6cha. 3p. 18l.           |                                      |
| 15. 162A. 0R. 2p. 17 1/4 yd. 4ft. 83in.  |                                      |
|  | 1/4 yd. = 2ft. 36in.                 |
| 162A. 0R. 2p. 17yd. 6ft. 119in.          |                                      |
| 17. 213C. 110ft. 1455in.                 | 23. 211ch. 19bu. 3pk. 1qt. 1pt.      |
| 19. 193tun 2hhd. 27gal. 2qt. 0pt.        | 25. 256w. 4da. 3h. 39m. 19s.         |
| 21. 211tun 0hhd. 53gal. 1qt. 1pt.        | 27. 11S. 0° 30' 21".                 |

### SUBTRACTION OF COMPOUND NUMBERS.

- (ART. 102, p. 115.)
- |                            |                                    |
|----------------------------|------------------------------------|
| 3. 51£. 18s. 10d. 2far.    | 9. 1T. 2cwt. 0qr. 24lb. 3oz. 14dr. |
| 5. 691lb. 9oz. 4pwt. 22gr. | 11. 151E.E. 4gr. 2na. 1 1/4 in.    |
| 7. 63lb 11 1/3 13 19gr.    |                                    |

13. 8deg. 59 $\frac{1}{2}$ m. 1fur. 39rd. 2 $\frac{1}{2}$ ft. 10in.  
 $\frac{1}{2}$ ft. = 6in.

8deg. 59 $\frac{1}{2}$ m. 1fur. 39rd. 3ft. 4in.  
 $\frac{1}{2}$ m. = 1fur. 13rd. 5ft. 6in.

8deg. 59m. 3fur. 12rd. 8ft. 10in.

15. 13m. 5fur. 3cha. 1p. 21l.

17. 41A. 1R. 38p. 18 $\frac{1}{4}$ yd. 8ft. 143in.  
 $\frac{1}{4}$ yd. = 2ft. 36in.

41A. 1R. 38p. 19yd. 2ft. 35in.

19. 371C. 126ft. 1683in.

21. 61tun 1hhd. 60gal. 1qt.  
 1pt. 2gi.

23. 59tun 2hhd. 42gal. 2qt. 1pt.

25. 53ch. 31bu. 1pk. 5qt. 0pt.

27. 4w. 1da. 9h. 26m. 27sec.

29. 4S. 7° 58' 52".

(ART. 103, p. 118.)

(2.)			(3.)			(4.)			(5.)		
y.	mo.	da.	y.	mo.	da.	y.	mo.	da.	y.	mo.	da.
1857	0	6	1857	3	25	1848	1	23	1845	5	8
1853	2	21	1852	10	15	1767	6	11	1767	2	15
3	9	15	4	5	10	80	7	12	78	2	23

# MISCELLANEOUS EXERCISES IN ADDITION AND SUBTRACTION OF COMPOUND NUMBERS.

(PAGE 119.)

(1.)				(2.)					(3.)				
lb.	oz.	pwt.	gr.	h	3	3	3	gr.	T.	cwt.	qr.	lb.	oz.
4	8	13	8	7	3	2	2	1	17	11	3	11	12
5	11	19	23	2	10	0	1	13	11	17	1	19	11
8	0	17	15	2	3	7	2	17	53	19	1	17	8
18	9	14	10	12	5	3	0	11	27	19	3	18	9
37	7	5	8						16	3	3	0	13
									127	12	1	18	5

(4.)			(5.)				(6.)				
£.	s.	d.	lb.	oz.	pwt.	gr.	lb.	3	5	9	gr
7671	0	0	73	0	0	0	71	8	1	1	14
1728	17	9	26	11	13	14	7	9	1	1	17
5942	2	3	46	0	6	10	63	10	7	2	17

(7.)				(8.)				(9.)			
T.	cwt.	qr.	lb.	oz.	yd.	qr.	na.	T.	cwt.	qr.	lb.
28	13	0	0	0	37	3	3	2	13	1	17
10	17	0	19	14	18	1	3	3	0	0	17
17	15	3	5	2	31	1	2	1	0	3	11
					87	3	0	6	14	1	20

(10.)					(11.)				(12.)				
m.	fur.	rd.	ft.	in.	yd.	qr.	na.		m.	fur.	rd.	ft.	in.
16	7	18	14	11	76	0	0		20	0	0	0	0
19	1	13	16	9	18	3	2		3	4	18	13	8
97	3	27	13	3	57	0	2		16	3	21	21 $\frac{1}{2}$	4
47	5	37	13	10								$\frac{1}{2}=6$	
181	2	18	8 $\frac{1}{2}$	9					16	3	21	2	10
			$\frac{1}{2}=6$										
181	2	18	9	3									

NOTE. As 8 $\frac{1}{2}$  feet and 9 inches are equal to 8 feet and 15 inches, so we find 8 feet 15 inches equal to 9 feet 3 inches.

NOTE. The half-foot, which is 6 inches, is added to the 4 inches, and their sum is 10 inches.

(13.)					(14.)			(15.)			
A.	R.	p.	ft.	in.	cord.	ft.	in.	A.	R.	p.	ft.
144	3	0	0	0	18	0	0	169	3	15	227
18	1	17	200	100	3	100	1000	187	1	15	165
126	1	22	71 $\frac{1}{4}$	44	14	27	728	217	2	28	165
			$\frac{1}{4}=36$					574	3	20	12 $\frac{1}{2}$
126	1	22	71	80							

NOTE. The  $\frac{1}{4}$  of a foot, which is 36 inches, is added to the 44 inches, and their sum is 80 inches.

(16.)		
cord.	ft.	in.
18	116	1000
17	111	1600
21	109	1716
58	82	860

(17.)

T.	ft.	in.
17	0	0
5	18	765
11	21	963

(18.)

gal.	qt.	pt.
169	0	0
76	3	1
92	0	1

(19.)

ch.	bu.	pk.	qt.
17	18	0	0
5	20	1	7
11	33	2	1

(20.)

y.	mo.	d.	h.	m.	s.
33	0	0	0	0	0
47	10	27	18	50	14
35	1	2	5	9	46

(21.)

s.	o	'	"
11	15	36	15
5	18	50	18
5	26	45	57

(22.)

gal.	qt.	pt.
167	3	1
186	1	1
108	2	1
123	3	0
586	2	1

(23.)

bu.	pk.	qt.	pt.
17	1	7	1
18	3	2	0
19	1	3	1
51	3	0	1
107	1	5	1

(24.)

y.	mo.	d.
13	4	13
12	11	23
18	9	29
45	2	5

(25.)

y.	d.	h.	m.	s.
18	345	13	37	15
87	169	12	16	28
316	144	20	53	18
13	360	21	57	15
436	290	20	44	16

(27.)

lb.	oz.	pwt.	gr.
106	0	0	0
5	11	12	15
3	0	13	14
7	11	14	23
17	0	1	4
88	11	18	20

(28.)

yd.	qr.	na.
17	3	0
3	3	2
4	1	3
8	1	1
9	1	3

(29.)

s.	o	'	"
3	18	45	15
7	15	36	18
5	21	38	27
4	26	0	0

(30.)

s.	o	'	"
3	18	14	35
11	25	30	50
3	22	43	45

**NOTE.** As this question is in Motion, it is necessary to reject the 12s in the sum of the signs.

**NOTE.** To perform this question, we add 12 signs to the longitude of the star, and from their sum subtract the longitude of the planet, because all the planets move eastward, as seen from the sun.

## MULTIPLICATION OF COMPOUND NUMBERS.

(ART. 106, p. 124.)

(3.)

m.	fur.	rd.	
3	7	18	$\times 30 = 5 \times 6$
		5	
19	5	10	
		6	
117	7	20	

(4.)

T.	cwt.	qr.	lb.	
2	7	3	18	$\times 84 = 7 \times 12$
			7	
16	15	2	1	
			12	
201	6	0	12	

(5.)

yd.	qr.	na.	
7	3	2	$\times 72 = 6 \times 12$
		6	
47	1	0	
		12	
567	0	0	

(6.)

yd.	qr.	na.	
3	2	1	$\times 132 = 12 \times 11$
		12	
42	3	0	
		11	
470	1	0	

(ART. 107, p. 125.)

NOTE. It is sometimes more convenient to use as multipliers the nearest composite numbers than to follow the Rule.

(2.)			(3.)			(4.)					
lb.	oz.	dr.	£.	s.	d.	m.	fur.	rd.	yd.	ft.	in.
17	10	13	2	17	9½	17	3	19	3	2	7
		10			10						10
176	12	2	28	17	11	174	2	36	5	1	10
		6			9						3
1060	8	12=60	260	1	3=90	523	0	30	5	2	6=30
35	5	10=2	20	4	6½=7	139	3	37	2½	2	8=8
1095	14	6=62	280	5	9½=97	662	4	28	3	2	2=38

(5.)

bu.	pk.	qt.	pt.	
27	3	6	1	$\times 8$
<hr/>				10
279	2	1	0	
<hr/>				9
2515	3	1	0	$= 90$
223	2	4	0	$= 8$
<hr/>				
2739	1	5	0	$= 98$

(6.)

yd.	qr.	na.	
7	3	2	$\times 7$
<hr/>			10
78	3	0	$\times 4$
<hr/>			10
787	2	0	
<hr/>			3
2362	2	0	$= 300$
315	0	0	$= 40$
55	0	2	$= 7$
<hr/>			
2732	2	2	$= 347$

(7.)

A.	R.	p.	yd.	ft.	in.	
13	3	14	18	7	76	$\times 1$
<hr/>						9
124	2	11	17	$\frac{3}{4}$	4	108
<hr/>						2
249	0	23	6	$\frac{1}{4}$	0	72 $= 18$
13	3	14	18	7	76	$= 1$
262	3	37	24	$\frac{1}{2}$	8	4 $= 19$
<hr/>						$\frac{1}{2} = 2$ 36
262	3	37	25	1	40	$= 19$

(8.)

T.	cwt.	qr.	lb.	oz.	
17	14	3	18	14	$\times 1$
<hr/>					10
177	9	1	13	12	$\times 5$
<hr/>					10
1774	13	3	12	8	
<hr/>					4
7098	15	2	0	0	$= 400$
887	6	3	18	12	$= 50$
17	14	3	18	14	$= 1$
<hr/>					
8003	17	1	12	10	451

## DIVISION OF COMPOUND NUMBERS.

(ART. 110, p. 127.)

(2.)

£.	s.	d.
6)6409	10	0
6)1068	5	0
10)178	0	10
<hr/>		17 16 1

(3.)

m.	fur.	rd.
5)117	7	20
6)23	4	28
<hr/>		3 7 18

(4.)

T.	cwt.	qr.	lb.
12)201	6	6	12
7)16	15	2	1
<hr/>			2 7 3 18

(5.)

yd.	qr.	n.
6)567	0	0
12)94	2	0
<hr/>		7 3 2

(6.)

yd.	qr.	na.
12)470	1	0
11)39	0	3
<hr/>		3 2 1







# MISCELLANEOUS EXAMPLES IN MULTIPLICATION AND DIVISION OF COMPOUND NUMBERS.

(ART. 111, p. 129.)

(1.)

cwt.	qr.	lb.
8	3	20
		5
44	3	0
		6
268	2	0
68	2	0
200	0	0

£.	s.	d.
1	17	6
		10
18	15	0
		10
187	10	0
		2
375	0	0

Ans.

(2.)

A.	R.	p.
12)11067	1	8
12)922	1	4
	76	3 17
	4	
	307R.	
	40	
	12297p.	

£.	s.	d.
0	1	9½ × 7
		10
0	17	11 × 9
		10
8	19	2 × 2
		10
89	11	8 × 2
		10
895	16	8 = 10000
179	3	4 = 2000
17	18	4 = 200
8	1	3 = 90
	12	6½ = 7

Ans. 1101 12 1½ = 12297

(3.)

m.	fur.	rd.
18	7	32
		10
189	6	0
		10
1897	4	0

m.	fur.	rd.
2644	3	12
1897	4	0
746	7	12

Ans.

(4.)

y.	d.
1807	365
1798	9
9y.	3285d.

h.	m.
11	19 P. M.
3	17 A. M.
20	2

1 add for leap year.  
67 " from July 4 to  
3353 days. [Sept. 9.

Ans. 3353d. 20h. 2m.

(5.)

$$3124\text{rd.} \times 8 = 24992\text{rd.} = 78\text{m. } 0\text{fur. } 32\text{rd.}$$

m.	fur.	rd
121	5	0
78	0	32
<hr/>		
Ans.	43	4 8

(6.)

cwt.	qr.	lb.
7	3	18
<hr/>		
126	3	13
71	1	12
<hr/>		
55	2	1

$$= 12688\text{lb.}$$

cwt.	qr.	lb.
7	3	18
<hr/>		
71	1	12

$$= 7137\text{lb.}$$

$$71\ 37 \times 6 = \$428.22$$

$$55\ 51 \times 7 = 388.57$$


---


$$= \$816.79$$

$$126\ 88 \times 5 = \$634.40$$


---


$$\text{Ans. } \$182.39$$

(7.)

£.	s.	d.
17	18	10
<hr/>		
305	0	2
207	0	0
<hr/>		
35	0	2

$$\text{Ans.}$$

£.	s.	d.
1	17	6
<hr/>		
270	0	0
<hr/>		
		144

(8.)

m.	fur.	rd.
17	4	30
<hr/>		
175	7	20
124	3	0
<hr/>		
51	4	20
<hr/>		
50		

$$\text{Ans. } 1\ 4\ 20$$

m.	fur.	rd.
12	3	20
<hr/>		
124	3	0

(9.)

$$\$5.75 \times 760 = \$4370$$

$$\$4370 \div .02 = 218500\text{lb.}$$

$$218500\text{lb.} \div 2 = 109250\text{lb.};$$

$$109250\text{lb.} = 54\text{T. } 12\text{cwt. } 2\text{qr.}$$

$$\text{Ans.}$$

(10.)

A.	B.	p.	ft.
0	0	44	200
<hr/>			
4	3	0	133
2	2	0	240
<hr/>			
2	0	39	165½

$$1\text{s. } 2½\text{d.} \times 97903 = 5914\text{£. } 19\text{s. } 5½\text{d.}$$

$$\text{Ans.}$$

(11.)

$$100 \times 100 = 10000 \text{ sq. rd. } 3563 \times \$ 1.75 = \$ 6235.25 \text{ Ans.}$$

$$5A. 3R. 17p. = 937$$

$$50 \times 50 = 2500$$

$$\underline{3000}$$

$$6437$$

$$3563 \text{ sq. rd.}$$

(12.)

78A. 3R. 30p. = 12630p.;  $30 \times 30 \times 10 = 9000p.$ ;  $9000p. \times \$ 8.50 = \$ 76500$ ;  $12630p. - 9000p. = 3630p.$ ;  $3630p. \times 272\frac{1}{2} = 988267\frac{1}{2}ft.$ ;  $988267\frac{1}{2}ft. \times \$ 0.02 = \$ 19765.35$ ;  $\$ 76500 + \$ 19765.35 = \$ 96265.35$ ;  $\$ 96265.35 - \$ 7000 = \$ 89265.35$ ,  
Ans.

## CANCELLATION.

(ART. 117, p. 135.)

$$5. \frac{\overset{2}{\cancel{8}} \times \overset{2}{\cancel{6}} \times 3}{\cancel{6} \times \cancel{3} \times 4} = 2.$$

$$6. \frac{\overset{2}{\cancel{17}} \times \overset{2}{\cancel{6}} \times 2}{\cancel{6} \times 2 \times \cancel{17}} = 1.$$

$$7. \frac{\overset{5}{\cancel{15}} \times 30 \times \overset{10}{\cancel{10}}}{\cancel{10} \times \cancel{15}} = 30.$$

$$10. \frac{\overset{3}{\cancel{9}} \times \overset{2}{\cancel{8}} \times \overset{2}{\cancel{2}} \times \overset{14}{\cancel{14}}}{\cancel{3} \times \cancel{4} \times \overset{7}{\cancel{6}} \times \overset{7}{\cancel{7}}} = 4.$$

$$11. \frac{\overset{2}{\cancel{16}} \times \overset{5}{\cancel{5}} \times \overset{3}{\cancel{10}} \times \overset{3}{\cancel{18}}}{\cancel{8} \times \cancel{6} \times \overset{2}{\cancel{2}} \times \overset{12}{\cancel{12}}} = \frac{2^5}{2} [= 12\frac{1}{2}].$$

$$12. \frac{\overset{2}{\cancel{22}} \times \overset{3}{\cancel{9}} \times \overset{2}{\cancel{12}} \times 5}{\cancel{3} \times \cancel{11} \times \overset{6}{\cancel{6}} \times 4} = 15.$$

$$13. \frac{\overset{5}{\cancel{25}} \times 7 \times \overset{2}{\cancel{14}} \times \overset{3}{\cancel{36}}}{\cancel{4} \times \overset{10}{\cancel{10}} \times \overset{2}{\cancel{21}} \times \overset{3}{\cancel{54}}} = \frac{7}{1} [= 1\frac{1}{3}].$$

$$14. \frac{\overset{2}{\cancel{26}} \times \overset{3}{\cancel{72}} \times \overset{3}{\cancel{81}} \times \overset{2}{\cancel{12}}}{\overset{13}{\cancel{36}} \times \overset{13}{\cancel{13}} \times \overset{24}{\cancel{24}} \times \overset{54}{\cancel{54}}} = 3.$$

$$16. \frac{\overset{2}{\cancel{8}} \times \overset{4}{\cancel{4}} \times \overset{3}{\cancel{9}} \times \overset{2}{\cancel{2}} \times \overset{12}{\cancel{12}} \times \overset{16}{\cancel{16}} \times 5}{\cancel{4} \times \cancel{6} \times \cancel{6} \times \cancel{3} \times \cancel{8} \times \cancel{4} \times \cancel{20}} = 2.$$

$$17. \frac{6 \times 15 \times 16 \times 24 \times 12 \times 21 \times 27}{2 \times 10 \times 9 \times 8 \times 36 \times 7 \times 3} = 8.$$

(ART. 124, p. 138.)

(2.)	(3.)	(4.)	(5.)	(5.)
85)95(1	72)168(2	119)121(1	12)18(1	6)24(4
<u>85</u>	<u>144</u>	<u>119</u>	<u>12</u>	<u>24</u>
10)85(8	24)72(3	2)119(59	6)12(2	
<u>80</u>	<u>72</u>	<u>118</u>	<u>12</u>	
5)10(2		1)2(2		
<u>10</u>		<u>2</u>		
(5.)		(6.)		
6)30(5		12)15(1	3)18(6	
<u>30</u>		<u>12</u>	<u>18</u>	
		3)12(4		
		<u>12</u>		

(ART. 128, p. 140.)

(3.)	(4.)
2)3, 4, 5, 6, 7, 8	4)10, 12, 16, 20, 24
<u>3)3, 2, 5, 3, 7, 4</u>	<u>2)10, 3, 4 5 6</u>
2)1, 2, 5, 1, 7, 4	3) 5, 3, 2, 5, 3
<u>1, 1, 5, 1, 7, 2</u>	<u>5) 5, 1, 2, 5, 1</u>
	<u>1, 1, 2, 1, 1</u>

$$1 \times 3 \times 2 \times 5 \times 7 \times 2 = 840 \text{ Ans.} \quad 4 \times 2 \times 3 \times 5 \times 2 = 240 \text{ Ans.}$$

(5.)	(5. By Cancellation.)
2)9 8 12 18 24 36 72	9 8 12 18 24 36 72
<u>3)9 4 6 9 12 18 36</u>	<u>Ans. 72.</u>
2)3 4 2 3 4 6 12	(6.)
<u>3)3 2 1 3 2 3 6</u>	2)10 12 16 18 20
2)1 2 1 1 2 1 2	<u>2)6 8 9 10</u>
<u>1 1 1 1 1 1 1</u>	3)3 4 9 5
2 \times 3 \times 2 \times 3 \times 2 = 72 \text{ Ans.}	<u>1 4 3 5</u>

$$2 \times 2 \times 3 \times 4 \times 3 \times 5 = 720 \text{ days.}$$

## COMMON FRACTIONS.

2. (ART. 135, p. 142.)	$\frac{1}{5}$	7.	$\frac{123}{388}$
3.	$\frac{2}{8}$	8.	$\frac{1}{4}$
4.	$\frac{1}{8}$	9.	$\frac{7891}{5118}$
5.	$\frac{3}{8}$	10.	$\frac{173}{308}$
6.	$\frac{1}{2}$		

2. (ART. 136, p. 143.)	$\frac{52}{7}$	10.	$\frac{360}{13}$
3.	$\frac{13}{4}$	11.	$\frac{12322}{111}$
4.	$\frac{103}{11}$	12.	$\frac{125}{1}$
5.	$\frac{9}{11}$	13.	$\frac{150}{8}$
6.	$\frac{187}{12}$	14.	$\frac{675}{9}$
7.	$\frac{162}{8}$	15.	$\frac{343}{1}$
8.	$\frac{18848}{1117}$	16.	$\frac{1260}{15}$
9.	$\frac{5142}{117}$		

2. (ART. 137, p. 144.)	$\frac{12}{1}$	7.	$\frac{1}{1}$
3.	$\frac{108}{17}$	8.	$\frac{567}{1}$
4.	$\frac{10111}{111}$	9.	$\frac{932}{9}$
5.	$\frac{1858}{878}$	10.	$\frac{4153}{153}$
6.	$\frac{1428}{1}$		

(ART. 138, p. 145.)			
3.	$\frac{2}{3} \times \frac{4}{5} \times \frac{6}{7} = \frac{16}{35}$	Ans.	
4.	$\frac{7}{8} \times \frac{9}{11} \times \frac{7}{1} = \frac{441}{88} = 5\frac{1}{88}$	[Ans.]	
5.	$\frac{7}{8} \times \frac{9}{11} \times \frac{3}{8} \times \frac{4}{7} = \frac{27}{176}$	Ans.	
6.	$\frac{11}{17} \times \frac{1}{2} \times \frac{3}{4} \times \frac{1}{20} \times \frac{7}{1} = \frac{231}{2720}$	[Ans.]	
7.	$\frac{3}{5} \times \frac{4}{11} \times \frac{11}{17} \times \frac{17}{23} \times \frac{23}{4} = 3$	[Ans.]	
8.	$\frac{1}{5} \times \frac{8}{9} \times \frac{9}{11} \times \frac{5}{8} \times \frac{3}{7} = \frac{3}{77}$	[Ans.]	
9.	$\frac{3}{7} \times \frac{4}{11} \times \frac{7}{9} \times \frac{9}{10} \times \frac{13}{3} = 5\frac{26}{55}$	Ans.	
10.	$\frac{15}{16} \times \frac{8}{9} \times \frac{7}{11} = \frac{35}{176}$	Ans.	
11.	$\frac{8}{11} \times \frac{22}{25} \times \frac{15}{22} \times \frac{11}{8} = 3$	[Ans.]	
12.	$\frac{5}{7} \times \frac{3}{15} \times \frac{4}{16} \times \frac{35}{4} \times \frac{11}{5} = 1\frac{1}{16}$	Ans.	

## (ART. 140, p. 147.)

(2.)

$$\begin{array}{l} 3 \times 6 = 18 = \frac{18}{1} = \frac{9}{\frac{1}{2}} \\ 5 \times 4 = 20 = \frac{20}{1} = \frac{10}{\frac{1}{2}} \\ \hline 4 \times 6 = 24 \end{array}$$

(3.)

$$\begin{array}{l} 7 \times 5 \times 2 = 70 = \frac{70}{1} \\ 4 \times 9 \times 2 = 72 = \frac{72}{1} \\ 1 \times 9 \times 5 = 45 = \frac{45}{1} \\ \hline 9 \times 5 \times 2 = 90 \end{array}$$

(4.)

$$\begin{array}{l} 4 \times 8 \times 11 = 352 = \frac{352}{1} \\ 3 \times 7 \times 11 = 231 = \frac{231}{1} \\ 5 \times 7 \times 8 = 280 = \frac{280}{1} \\ \hline 7 \times 8 \times 11 = 616 \end{array}$$

(6.)

$$\begin{array}{l} 1 \times 5 \times 8 \times 4 = 160 = \frac{160}{1} \\ 2 \times 6 \times 8 \times 4 = 384 = \frac{384}{1} \\ 7 \times 6 \times 5 \times 4 = 840 = \frac{840}{1} \\ 1 \times 6 \times 5 \times 8 = 240 = \frac{240}{1} \\ \hline 6 \times 5 \times 8 \times 4 = 960 \end{array}$$

(5.)

$$\begin{array}{l} 8 \times 12 \times 3 = 288 = \frac{288}{1} \\ 5 \times 9 \times 3 = 135 = \frac{135}{1} \\ 2 \times 9 \times 12 = 216 = \frac{216}{1} \\ \hline 9 \times 12 \times 3 = 324 \end{array}$$

## (ART. 141, p. 148.)

(2.)

$$\begin{array}{cccc} \frac{3}{2}, & \frac{4}{5}, & \frac{5}{6}, & \frac{7}{8} \\ 2) & 4 & 5 & 6 & 8 \end{array}$$

$$\begin{array}{cccc} 2) & 2 & 5 & 3 & 4 \\ \hline & 1 & 5 & 3 & 2 \end{array}$$

$$2 \times 2 \times 5 \times 3 \times 2 = 120$$

$$\begin{array}{r|l} 120 & \\ 4 & 30 \times 3 = 90 \\ 5 & 24 \times 4 = 96 \\ 6 & 20 \times 5 = 100 \\ 8 & 15 \times 7 = 105 \end{array}$$

$$\frac{90}{120}, \frac{96}{120}, \frac{100}{120}, \frac{105}{120} \text{ Ans.}$$

(3.)

$$\begin{array}{cccc} \frac{3}{2}, & \frac{4}{5}, & \frac{5}{6}, & \frac{7}{8} \\ 4 \times 5 \times 9 \times 11 = 1980 \end{array}$$

$$\begin{array}{r|l} 1980 & \end{array}$$

$$4 \quad 495 \times 3 = 1485$$

$$5 \quad 396 \times 2 = 792$$

$$9 \quad 220 \times 4 = 880$$

$$11 \quad 180 \times 2 = 360$$

$$\frac{1485}{1980}, \frac{792}{1980}, \frac{880}{1980}, \frac{360}{1980} \text{ Ans.}$$



(4.)

$$\begin{array}{r} \frac{7}{8}, \frac{9}{10}, \frac{31}{4} \\ 4)8 \quad 10 \quad 4 \\ 2)2 \quad 10 \quad 1 \\ \hline 1 \quad 5 \quad 1 \end{array}$$

$$4 \times 2 \times 5 = 40$$

$$\begin{array}{r|l} 40 & \\ 8 & 5 \times 7 = 35 \\ 10 & 4 \times 9 = 36 \\ 4 & 10 \times 31 = 310 \\ \hline & \frac{35}{40}, \frac{36}{40}, \frac{310}{40} \text{ Ans.} \end{array}$$

(5.)

$$\begin{array}{r} \frac{3}{7}, \frac{9}{14}, \frac{11}{28}, \frac{37}{7} \\ 7)7 \quad 14 \quad 28 \quad 7 \\ 2)1 \quad 2 \quad 4 \quad 1 \\ \hline 1 \quad 1 \quad 2 \quad 1 \end{array}$$

$$7 \times 2 \times 2 = 28$$

$$\begin{array}{r|l} 28 & \\ 7 & 4 \times 3 = 12 \\ 14 & 2 \times 9 = 18 \\ 28 & 1 \times 11 = 11 \\ 7 & 4 \times 38 = 152 \end{array}$$

$$\frac{12}{28}, \frac{18}{28}, \frac{11}{28}, \frac{152}{28} \text{ Ans.}$$

(6.)

$$\begin{array}{r} \frac{1}{2}, \frac{2}{3}, \frac{5}{6}, \frac{5}{8}, \frac{7}{8}, \frac{15}{12} \\ 2)2 \quad 4 \quad 6 \quad 8 \quad 8 \quad 12 \\ 3)1 \quad 2 \quad 3 \quad 4 \quad 4 \quad 6 \\ 2)1 \quad 2 \quad 1 \quad 4 \quad 4 \quad 2 \\ 2)1 \quad 1 \quad 1 \quad 2 \quad 2 \quad 1 \\ \hline 1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \end{array}$$

$$2 \times 3 \times 2 \times 2 = 24$$

$$\begin{array}{r|l} 24 & \\ 2 & 12 \times 1 = 12 \\ 4 & 6 \times 3 = 18 \\ 6 & 4 \times 5 = 20 \\ 8 & 3 \times 5 = 15 \\ 8 & 3 \times 7 = 21 \\ 12 & 2 \times 5 = 10 \end{array}$$

$$\frac{12}{24}, \frac{18}{24}, \frac{20}{24}, \frac{15}{24}, \frac{21}{24}, \frac{10}{24} \text{ Ans.}$$

(7.)

$$\begin{array}{r} \frac{4}{9}, \frac{3}{3}, \frac{1}{3}, \frac{1}{4}, \frac{1}{6}, \frac{1}{12} \\ 3)9 \quad 3 \quad 3 \quad 4 \quad 6 \quad 12 \\ 2)3 \quad 1 \quad 1 \quad 4 \quad 2 \quad 4 \\ 2)3 \quad 1 \quad 1 \quad 2 \quad 1 \quad 2 \\ \hline 3 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \end{array}$$

$$3 \times 2 \times 2 \times 3 = 36$$

$$\begin{array}{r|l} 36 & \\ 9 & 4 \times 4 = 16 \\ 3 & 12 \times 2 = 24 \\ 3 & 12 \times 1 = 12 \\ 4 & 9 \times 1 = 9 \\ 6 & 6 \times 1 = 6 \\ 12 & 3 \times 1 = 3 \end{array}$$

$$\frac{16}{36}, \frac{24}{36}, \frac{12}{36}, \frac{9}{36}, \frac{6}{36}, \frac{3}{36} \text{ Ans.}$$

(8.)

$$\begin{array}{r} \frac{1}{3}, \frac{4}{9}, \frac{7}{12} \\ 3 \overline{) 6 \quad 9 \quad 12} \\ 2 \overline{) 2 \quad 3 \quad 4} \\ 1 \quad 3 \quad 2 \end{array}$$

$$3 \times 2 \times 3 \times 2 = 36$$

$$\begin{array}{r} 36 \\ 6 \overline{) 36} \quad 6 \times 5 = 30 \\ 9 \overline{) 36} \quad 4 \times 4 = 16 \\ 12 \overline{) 36} \quad 3 \times 7 = 21 \end{array}$$

$$\frac{36}{36}, \frac{16}{36}, \frac{21}{36} \text{ Ans.}$$

(9.)

$$7\frac{3}{4}, 5\frac{8}{11}, 7, 8 = \frac{31}{4}, \frac{61}{11}, 7, 8$$

$$4 \times 11 = 44$$

$$\begin{array}{r} 44 \\ 4 \overline{) 44} \quad 11 \times 31 = 341 \\ 11 \overline{) 44} \quad 4 \times 61 = 244 \\ 1 \overline{) 44} \quad 4 \times 7 = 308 \\ 1 \overline{) 44} \quad 4 \times 8 = 352 \end{array}$$

$$\frac{341}{44}, \frac{244}{44}, \frac{308}{44}, \frac{352}{44} \text{ Ans.}$$

(10.)

$$\frac{3}{4}, 4, 5, 7, 9 = \frac{3}{4}, \frac{4}{1}, \frac{5}{1}, \frac{7}{1}, \frac{9}{1}$$

$$\begin{array}{r} 4 \\ 4 \overline{) 4} \quad 1 \times 3 = 3 \\ 1 \overline{) 4} \quad 4 \times 4 = 16 \\ 1 \overline{) 4} \quad 4 \times 5 = 20 \\ 1 \overline{) 4} \quad 4 \times 7 = 28 \\ 1 \overline{) 4} \quad 4 \times 9 = 36 \end{array}$$

$$\frac{3}{4}, \frac{16}{4}, \frac{20}{4}, \frac{28}{4}, \frac{36}{4} \text{ Ans.}$$

2. (ART. 143, p. 149.)

$$3\frac{10}{17} \mid 5.$$

$$2\frac{19}{17}$$

3.

$$2\frac{17}{17} \mid 6.$$

$$1\frac{14}{17}$$

4.

$$2\frac{15}{17} \mid 7.$$

$$1\frac{9}{17}$$

(ART. 144, p. 149.)

(2.)

$$\begin{array}{r} 4 \overline{) 8 \quad 12 \quad 16} \\ 2 \overline{) 2 \quad 3 \quad 4} \\ 1 \quad 3 \quad 2 \end{array}$$

$$4 \times 2 \times 3 \times 2 = 48$$

$$\begin{array}{r} 48 \\ 8 \overline{) 48} \quad 6 \times 5 = 30 \\ 12 \overline{) 48} \quad 4 \times 11 = 44 \\ 16 \overline{) 48} \quad 3 \times 13 = 39 \end{array}$$

$$\frac{113}{48} = 2\frac{17}{48} \text{ Ans.}$$

(3.)

$$\begin{array}{r} 2 \overline{) 20 \quad 18 \quad 14} \\ 10 \quad 9 \quad 7 \end{array}$$

$$2 \times 10 \times 9 \times 7 = 1260$$

$$\begin{array}{r} 1260 \\ 20 \overline{) 1260} \quad 63 \times 9 = 567 \\ 18 \overline{) 1260} \quad 70 \times 11 = 770 \\ 14 \overline{) 1260} \quad 90 \times 5 = 450 \end{array}$$

$$\frac{1787}{1260} = 1\frac{527}{1260} \text{ [Ans.]}$$

(4.)

$$21 \times 37 = 777$$

$$\begin{array}{r} 21 \overline{) 777} \\ 37 \overline{) 21} \times 19 = 703 \\ 37 \overline{) 21} \times 31 = 651 \\ \hline 1354 \\ 777 \overline{) 1354} = 1\frac{577}{777} \end{array}$$

[Ans.]

(5.)

$$\begin{array}{r} 4) 4 \quad 6 \quad 8 \quad 12 \\ 3) 1 \quad 6 \quad 2 \quad 3 \\ 2) 1 \quad 2 \quad 2 \quad 1 \\ \hline 1 \quad 1 \quad 1 \quad 1 \\ 4 \times 2 \times 3 = 24 \\ \hline 24 \\ 4) 6 \times 3 = 18 \\ 6) 4 \times 5 = 20 \\ 8) 3 \times 3 = 9 \\ 12) 2 \times 1 = 2 \\ \hline 49 \\ 24 \overline{) 49} = 2\frac{1}{24} \text{ Ans.} \end{array}$$

(6.)

$$\begin{array}{r} 3) 9 \quad 21 \quad 24 \quad 2 \\ 2) 3 \quad 7 \quad 8 \quad 2 \\ \hline 3 \quad 7 \quad 4 \quad 1 \end{array}$$

$$3 \times 2 \times 3 \times 7 \times 4 = 504$$

$$\begin{array}{r} 504 \\ 9) 56 \times 4 = 224 \\ 21) 24 \times 8 = 192 \\ 24) 21 \times 11 = 231 \\ 2) 252 \times 1 = 252 \\ \hline 899 \\ 504 \overline{) 899} = 1\frac{395}{504} \end{array}$$

[Ans.]

(7.)

$$\begin{array}{r} 12) 72 \quad 84 \quad 96 \\ 2) 6 \quad 7 \quad 8 \\ \hline 3 \quad 7 \quad 4 \end{array}$$

$$12 \times 2 \times 3 \times 7 \times 4 = 2016$$

$$\begin{array}{r} 72 \overline{) 2016} \\ 84 \overline{) 28} \times 19 = 532 \\ 96 \overline{) 24} \times 51 = 1224 \\ 96 \overline{) 21} \times 71 = 1491 \\ \hline 3247 \\ 2016 \overline{) 3247} = 1\frac{1231}{2016} \end{array}$$

[Ans.]

(8.)

$$\begin{array}{r} 25) 25 \quad 50 \quad 75 \quad 100 \\ 2) 1 \quad 2 \quad 3 \quad 4 \\ \hline 1 \quad 1 \quad 3 \quad 2 \end{array}$$

$$25 \times 2 \times 3 \times 2 = 300$$

$$\begin{array}{r} 300 \\ 25) 12 \times 3 = 36 \\ 50) 6 \times 49 = 294 \\ 75) 4 \times 74 = 296 \\ 100) 3 \times 81 = 243 \\ \hline 869 \\ 300 \overline{) 869} = 2\frac{269}{300} \end{array}$$

[Ans.]

(9.)

$$\begin{array}{r} 2) 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8 \\ 2) 1 \ 3 \ 2 \ 5 \ 3 \ 7 \ 4 \\ 3) 1 \ 3 \ 1 \ 5 \ 3 \ 7 \ 2 \\ \hline 1 \ 1 \ 1 \ 5 \ 1 \ 7 \ 2 \\ 2 \times 2 \times 3 \times 5 \times 7 \times 2 = 840 \end{array}$$

$$\begin{array}{r} 840 \\ 2 \overline{) 420} \times 1 = 420 \\ 3 \overline{) 280} \times 2 = 560 \\ 4 \overline{) 210} \times 3 = 630 \\ 5 \overline{) 168} \times 4 = 672 \\ 6 \overline{) 140} \times 5 = 700 \\ 7 \overline{) 120} \times 6 = 720 \\ 8 \overline{) 105} \times 7 = 735 \\ \hline 4437 \\ 840 \overline{) 4437} = 5 \frac{79}{80} \text{ Ans.} \end{array}$$

(10.)

$$\begin{array}{r} 3) 9 \ 10 \ 11 \ 12 \ 13 \ 14 \ 15 \\ 2) 3 \ 10 \ 11 \ 4 \ 13 \ 14 \ 5 \\ 5) 3 \ 5 \ 11 \ 2 \ 13 \ 7 \ 5 \\ \hline 3 \ 1 \ 11 \ 2 \ 13 \ 7 \ 1 \\ 3 \times 2 \times 5 \times 3 \times 11 \times 2 \times 13 \times 7 = \\ \hline [180180 \end{array}$$

$$\begin{array}{r} 180180 \\ 9 \overline{) 20020} \times 8 = 160160 \\ 10 \overline{) 18018} \times 9 = 162162 \\ 11 \overline{) 16380} \times 10 = 163800 \\ 12 \overline{) 15015} \times 11 = 165165 \\ 13 \overline{) 13860} \times 12 = 166320 \\ 14 \overline{) 12870} \times 13 = 167310 \\ 15 \overline{) 12012} \times 14 = 168168 \\ \hline 1158085 \\ 180180 \overline{) 1158085} = 6 \frac{1491}{180180} \text{ Ans.} \end{array}$$

(11.)

$$\begin{array}{r} \frac{3}{8} \times \frac{3}{4} = \frac{6}{12} = \frac{1}{2} \\ \frac{5}{8} \times \frac{3}{8} = \frac{15}{64} \\ 2) 2 \ 48 \\ \hline 1 \ 24 \\ 2 \times 24 = 48 \end{array} \quad \begin{array}{r} 48 \\ 2 \overline{) 24} \times 1 = 24 \\ 48 \overline{) 1 \times 35} = 35 \\ \hline 59 \\ 48 \overline{) 59} = 1 \frac{11}{48} \text{ Ans.} \end{array}$$

(12.)

$$\begin{array}{r} \frac{3}{4} \times \frac{3}{8} = \frac{9}{32}; \frac{11}{12} \times \frac{1}{2} = \frac{11}{24} \\ 8) 32 \ 24 \\ \hline 4 \ 3 \\ 8 \times 4 \times 3 = 96 \\ 32 \overline{) 96} \\ 3 \times 21 = 63 \\ 24 \overline{) 44} \\ 4 \times 11 = 44 \\ \hline 107 \\ 96 \overline{) 107} = 1 \frac{11}{96} \text{ Ans.} \end{array}$$

(13.)

$$\begin{array}{r} \frac{1}{8} \times \frac{3}{8} = \frac{3}{64}; \frac{1}{8} \times \frac{7}{10} = \frac{7}{80} \\ 27 \times 50 = 1350 \\ 27 \overline{) 1350} \\ 50 \times 2 = 100 \\ 27 \times 7 = 189 \\ \hline 289 \\ 1350 \overline{) 289} \text{ Ans.} \end{array}$$

(14.)

$$\frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} = \frac{2}{5}$$

$$\frac{5}{6} \times \frac{6}{7} \times \frac{7}{10} = \frac{5}{10} = \frac{1}{2}$$

$$2 \times 5 = 10$$

$$\begin{array}{r} 10 \\ 5 \overline{) 2} \times 2 = 4 \\ 2 \overline{) 5} \times 1 = 5 \\ \hline 9 \end{array}$$

$$\frac{9}{10} \text{ Ans.}$$

(16.)

$$3\frac{3}{7} = 2\frac{4}{7}; 4\frac{1}{2} = \frac{9}{2}$$

$$\begin{array}{r} 7 \overline{) 14} \\ 1 \quad 2 \\ \hline 7 \times 2 = 14 \end{array}$$

$$\begin{array}{r} 14 \\ 7 \overline{) 2} \times 24 = 48 \\ 14 \overline{) 1} \times 67 = 67 \\ \hline 115 \\ \hline \frac{115}{14} = 8\frac{3}{14} \text{ Ans.} \end{array}$$

(15.)

$$\frac{1}{3} \times \frac{3}{11} \times \frac{11}{12} = \frac{1}{12}$$

$$\frac{1}{2} \times \frac{2}{9} = \frac{1}{9}$$

$$3 \overline{) 12} \quad \begin{array}{r} 9 \\ 4 \quad 3 \end{array}$$

$$3 \times 4 \times 3 = 36$$

$$\begin{array}{r} 36 \\ 12 \overline{) 3} \times 1 = 3 \\ 9 \overline{) 4} \times 1 = 4 \\ \hline 7 \end{array}$$

$$\frac{7}{36} \text{ Ans.}$$

(17.)

$$4\frac{3}{4} = \frac{19}{4}; 5\frac{3}{7} = \frac{41}{7}$$

$$4 \times 7 = 28$$

$$\begin{array}{r} 28 \\ 4 \overline{) 7} \times 19 = 133 \\ 7 \overline{) 4} \times 41 = 164 \\ \hline 297 \\ \hline \frac{297}{28} = 10\frac{17}{28} \text{ Ans.} \end{array}$$

(18.)

$$17\frac{3}{4} = \frac{71}{4}; 18\frac{1}{2} = \frac{221}{12}$$

$$\begin{array}{r} 4 \overline{) 12} \\ 1 \quad 3 \\ \hline 4 \times 3 = 12 \end{array}$$

$$\begin{array}{r} 12 \\ 4 \overline{) 3} \times 71 = 213 \\ 12 \overline{) 1} \times 221 = 221 \\ \hline 434 \\ \hline \frac{434}{12} = 36\frac{1}{3} \text{ Ans.} \end{array}$$

(ART. 147, p. 151.)

2.  
3.

$$\frac{5}{18} \overline{) 4.}$$

$$\frac{33}{111} \overline{) 6.}$$

$$\frac{232}{864} \overline{) 8.}$$

4

## SUBTRACTION OF COMMON FRACTIONS.

(2.) (ART. 148, p. 152.) (6.)

$$\frac{7}{18} - \frac{4}{21}$$

$$3 \times 6 \times 7 = 126$$

$$\begin{array}{r} 126 \\ 18 \overline{) 126} \\ 21 \overline{) 126} \end{array}$$

$$\begin{array}{r} 7 \times 7 = 49 \\ 6 \times 4 = 24 \\ \hline 25 \end{array}$$

Ans.

(3.)

$$\frac{12}{5} - \frac{11}{16}$$

$$4 \times 5 \times 4 = 80$$

$$\begin{array}{r} 80 \\ 20 \overline{) 80} \\ 16 \overline{) 80} \end{array}$$

$$\begin{array}{r} 4 \times 19 = 76 \\ 5 \times 11 = 55 \\ \hline 21 \end{array}$$

Ans.

(4.)

$$\frac{17}{24} - \frac{7}{20}$$

$$4 \times 6 \times 5 = 120$$

$$\begin{array}{r} 120 \\ 24 \overline{) 120} \\ 20 \overline{) 120} \end{array}$$

$$\begin{array}{r} 5 \times 17 = 85 \\ 6 \times 7 = 42 \\ \hline 43 \end{array}$$

Ans.

(5.)

$$\frac{11}{2} - \frac{1}{10}$$

$$2 \times 17 \times 5 = 170$$

$$\begin{array}{r} 170 \\ 34 \overline{) 170} \\ 10 \overline{) 170} \end{array}$$

$$\begin{array}{r} 5 \times 11 = 55 \\ 17 \times 1 = 17 \\ \hline 38 \end{array}$$

$$\frac{38}{170} = \frac{19}{85} \text{ Ans.}$$

$$\begin{array}{r} 3 \overline{) 18 \ 21} \\ 6 \ 7 \end{array}$$

$$\frac{31}{18} - \frac{2}{18}$$

$$4 \times 9 \times 4 = 144$$

$$\begin{array}{r} 144 \\ 36 \overline{) 144} \\ 16 \overline{) 144} \end{array}$$

$$\begin{array}{r} 4 \times 31 = 124 \\ 9 \times 9 = 81 \\ \hline 43 \end{array}$$

$$4 \overline{) 36 \ 16}$$

$$\begin{array}{r} 9 \ 4 \end{array}$$

Ans.

(7.)

$$\frac{18}{37} - \frac{3}{11}$$

$$37 \times 11 = 407$$

$$\begin{array}{r} 407 \\ 37 \overline{) 407} \\ 11 \overline{) 407} \end{array}$$

$$\begin{array}{r} 11 \times 18 = 198 \\ 3 \times 11 = 33 \\ \hline 87 \end{array}$$

Ans.

(8.)

$$\frac{111}{200} - \frac{1}{19}$$

$$200 \times 19 = 3800$$

$$\begin{array}{r} 3800 \\ 200 \overline{) 3800} \\ 19 \overline{) 3800} \end{array}$$

$$\begin{array}{r} 19 \times 111 = 2109 \\ 1 \times 200 = 200 \\ \hline 1909 \end{array}$$

Ans.

(9.)

$$\frac{10}{1000} - \frac{1}{1000}$$

$$10 \times 100 = 1000$$

$$\begin{array}{r} 1000 \\ 10 \overline{) 1000} \\ 1000 \overline{) 1000} \end{array}$$

$$\begin{array}{r} 100 \times 1 = 100 \\ 1 \times 1 = 1 \\ \hline 99 \end{array}$$

Ans.

(10.)

$$\frac{3}{11} \times \frac{2}{11} = \frac{6}{121}; \frac{1}{4} \times \frac{7}{2} = \frac{7}{8}; \frac{1}{11} \times \frac{14}{1} = \frac{14}{11}$$

$$\begin{array}{r} 154 \\ 11 \overline{) 14 \times 6 = 84} \\ 14 \overline{) 11 \times 1 = 11} \\ \hline 73 \text{ Ans.} \\ 154 \end{array}$$

(11.)

$$\frac{1}{9} \times \frac{9}{10} = \frac{1}{10}; \frac{1}{12} \times \frac{12}{13} = \frac{1}{13}$$

$$\begin{array}{r} 130 \\ 10 \overline{) 13} \\ 13 \overline{) 10} \\ \hline 3 \text{ Ans.} \\ 130 \end{array}$$

(12.)

$$\frac{3}{8} \times \frac{12}{8} = \frac{3}{2} \times \frac{3}{2} = \frac{9}{4} = 2\frac{1}{4}; \frac{2}{3} \times \frac{7}{12} = \frac{1}{3} \times \frac{7}{6} = \frac{7}{18}; \frac{2}{3} \times \frac{11}{12} = \frac{11}{18}$$

$$\begin{array}{r} 2) 16 \cdot 6 \\ \hline 8 \cdot 3 \\ \hline 48 \\ 16 \overline{) 3 \times 77 = 231} \\ 6 \overline{) 8 \times 23 = 184} \\ \hline 47 \text{ Ans.} \\ 48 \end{array}$$

(ART. 149, p. 152.)

$$\begin{array}{r} 7. \text{ From } 23 \\ \text{Take } 13\frac{1}{2} \\ \hline \text{Ans. } 9\frac{1}{2} \end{array}$$

$$\begin{array}{r} 8. 47 \\ \hline 13 \\ \hline \text{Ans. } 46\frac{7}{10} \end{array}$$

$$\begin{array}{r} 9. 139 \\ \hline 75\frac{1}{2} \\ \hline \text{Ans. } 63\frac{1}{2} \end{array}$$

(ART. 150, p. 154.)

NOTE. In the following questions, the new numerator is found by multiplying each numerator by the denominator of the other fraction; and the common denominator is obtained by multiplying together the two denominators.

(12.)

$$\begin{array}{r} 19\frac{1}{8} = 19\frac{1}{8} \\ 7\frac{3}{11} = 7\frac{3}{11} \\ \hline \text{Ans. } 11\frac{5}{8} \end{array}$$

(13.)

$$\begin{array}{r} 15\frac{1}{2} = 15\frac{1}{2} \\ 8\frac{1}{4} = 8\frac{1}{4} \\ \hline \text{Ans. } 62\frac{5}{8} \end{array}$$

(14.)

$$\begin{array}{r} 9\frac{1}{8} = 9\frac{1}{8} \\ 3\frac{1}{18} = 3\frac{1}{18} \\ \hline \text{Ans. } 52\frac{3}{4} \end{array}$$

(15.)

$$\begin{array}{r} 71\frac{1}{5} = 71\frac{1}{5} \\ 13\frac{7}{12} = 13\frac{7}{12} \\ \hline \text{Ans. } 57\frac{87}{180} \end{array}$$

(16.)	(17.)	(18.)
$61\frac{1}{2} = 61\frac{1}{2}$	$63$	$2\frac{1}{2} = 2\frac{1}{2}$
$33\frac{1}{2} = 33\frac{1}{2}$	$12\frac{3}{4}$	$3\frac{1}{2} = 3\frac{1}{2}$
Ans. $27\frac{1}{2}$	Ans. $50\frac{3}{4}$	$1\frac{1}{2} = 1\frac{1}{2}$
		Ans. $3\frac{1}{2}$
		$6\frac{1}{2}$

2. (ART. 153, p. 155.)	$6\frac{1}{2}$	8.	$352\frac{8}{11}$
3.	$2\frac{3}{4}$	9.	$43\frac{1}{2}$
4.	$1\frac{1}{2}$	10.	$\$ 7\frac{1}{2}$
5.	49	11.	$\$ 0.42$
6.	$76\frac{1}{12}$	12.	$\$ 3.24$
7.	$166\frac{1}{12}$	13.	$\$ 69\frac{1}{2}$

2. (ART. 154, p. 156.)	28	6.	$243\frac{5}{11}$
3.	88	7.	$8\frac{2}{3}$
4.	325	8.	$23\frac{2}{3}$
5.	1610	9.	$6\frac{5}{13}$

(ART. 155, p. 157.)

(3.)	(4.)	(5.)
$9\frac{3}{5}$	$12\frac{3}{7}$	$8\frac{1}{2}$
$5$	$7$	$9$
$45$	$84$	$72$
$1\frac{1}{2}$	$4\frac{1}{2}$	$8\frac{1}{2}$
Ans. $46\frac{1}{2}$	Ans. $88\frac{1}{2}$	Ans. $80\frac{1}{2}$
$3$	$3$	$11$
$5$	$7$	$9$
$8)15$	$5)21$	$12)99$
$1\frac{1}{2}$	$4\frac{1}{2}$	$8\frac{1}{2}$

(6.)	(7.)	(8.)
$7\frac{1}{10}$	$11\frac{1}{8}$	$7\frac{8}{11}$
$10$	$8$	$5$
$70$	$88$	$35$
$1\frac{1}{2}$	$6\frac{1}{2}$	$2\frac{1}{11}$
Ans. $71\frac{1}{2}$	Ans. $94\frac{1}{2}$	Ans. $\$ .37\frac{8}{11}$
$1$	$11\frac{1}{8}$	$6$
$10$	$8$	$5$
$9)10$	$7)48$	$11)30$
$1\frac{1}{2}$	$6\frac{1}{2}$	$2\frac{1}{11}$

(9.)	(10.)	(11.)
$23\frac{7}{12}$	$8\frac{3}{5}$	$\$ 6\frac{1}{9}$
$6$	$5$	$9$
$138$	$40$	$54$
$3\frac{1}{2}$	$1\frac{1}{5}$	$3\frac{1}{3}$
Ans. $\$ 141\frac{1}{2}$	Ans. $\$ 41\frac{1}{5}$	Ans. $\$ 57\frac{1}{3}$
$7$	$3$	$3$
$6$	$5$	$9$
$12)42$	$8)15$	$8)27$
$3\frac{1}{2}$	$1\frac{1}{5}$	$3\frac{1}{3}$



(12.)		(13.)		(14.)
$\begin{array}{r} \$637\frac{1}{2} \\ 12 \\ \hline 76.44 \\ 6 \\ \hline \text{Ans. } \$76.50 \end{array}$	$\begin{array}{r} 1 \\ 12 \\ 2)12 \\ \hline 6 \end{array}$	$\begin{array}{r} \$9\frac{3}{8} \\ 11 \\ \hline 99 \\ 4\frac{1}{8} \\ \hline 4\frac{1}{8} \end{array}$	$\begin{array}{r} 3 \\ 11 \\ 8)33 \\ \hline 4\frac{1}{8} \end{array}$	$\begin{array}{r} 4\frac{3}{8} \\ \$1.75 \\ 7.00 \\ \hline .65\frac{5}{8} \\ 8)525 \\ \hline .65\frac{5}{8} \end{array}$

(15.)		(16.)		(17.)
$\begin{array}{r} \$11\frac{7}{8} \\ 7 \\ \hline 77 \\ 6\frac{1}{8} \\ \hline \text{Ans. } \$83\frac{1}{8} \end{array}$	$\begin{array}{r} 7 \\ 7 \\ 8)49 \\ \hline 6\frac{1}{8} \end{array}$	$\begin{array}{r} \$10\frac{5}{8} \\ 9 \\ \hline 90 \\ 5\frac{5}{8} \\ \hline 95\frac{5}{8} \end{array}$	$\begin{array}{r} 5 \\ 9 \\ 8)45 \\ \hline 5\frac{5}{8} \end{array}$	$\begin{array}{r} \$3\frac{1}{8} \\ 5 \\ \hline 15 \\ 0\frac{5}{8} \\ \hline \text{Ans. } \$15\frac{5}{8} \end{array}$

(18.)		(19.)
$\begin{array}{r} \$7.62\frac{1}{2} \\ 15 \\ \hline 114.30 \\ 7\frac{1}{2} \\ \hline \text{Ans. } \$114.37\frac{1}{2} \end{array}$	$\begin{array}{r} 1 \\ 15 \\ 2)15 \\ \hline 7\frac{1}{2} \end{array}$	$\begin{array}{r} \$8.37\frac{1}{2} \\ 40 \\ \hline 334.80 \\ 20 \\ \hline \text{Ans. } \$335.00 \end{array}$

(ART. 156, p. 158.)

2.  $\frac{7}{8} \times \frac{8}{11} = \frac{7}{11}$  Ans.

3.  $\frac{\frac{1}{5}}{11} \times \frac{11}{20} = \frac{1}{4}$  Ans.

4.  $\frac{\frac{8}{13}}{13} \times \frac{13}{24} = \frac{1}{3}$  Ans.

5.  $\frac{\frac{18}{19}}{19} \times \frac{19}{90} = \frac{1}{5}$  Ans.

6.  $\frac{\frac{15}{17}}{17} \times \frac{17}{60} = \frac{1}{4}$  Ans.

7.  $\frac{1}{9} \times \frac{8}{17} = \frac{8}{153}$  Ans.

8.  $\frac{\frac{6}{23}}{23} \times \frac{23}{36} = \frac{1}{6}$  Ans.

9.  $\frac{7}{8} \times \frac{8}{9} = \frac{7}{9}$  Ans.

10.  $\frac{\frac{8}{11}}{11} \times \frac{11}{32} = \frac{1}{4}$  Ans.

11.  $\frac{7}{10} \times \frac{3}{4} = \frac{21}{40}$  Ans.

$$12. \frac{2}{3} \times \frac{3}{8} = \frac{1}{4}; \frac{7}{9} \times \frac{9}{11} = \frac{7}{11}; \frac{1}{4} \times \frac{7}{11} = \frac{7}{44} \text{ Ans.}$$

$$13. \frac{3}{9} \times \frac{4}{7} \times \frac{9}{11} = \frac{12}{77}; \frac{2}{3} \times \frac{6}{1} = \frac{12}{1}; \frac{12}{77} \times \frac{12}{1} = \frac{144}{77} = 1\frac{67}{77} \text{ [Ans.]}$$

(ART. 157, p. 159.)

$$2. 7\frac{1}{2} \times 8\frac{2}{3} = \frac{57}{2} \times \frac{14}{3} = \frac{238}{1} = 238 \text{ Ans.}$$

$$3. 4\frac{1}{2} \times 9\frac{1}{2} = \frac{9}{2} \times \frac{19}{2} = \frac{171}{2} = 85\frac{1}{2} \text{ Ans.}$$

$$4. 11\frac{2}{3} \times 8\frac{1}{2} = \frac{14}{3} \times \frac{17}{2} = \frac{238}{3} = 79\frac{1}{3} \text{ Ans.}$$

$$5. 12\frac{3}{4} \times 11\frac{5}{8} = \frac{51}{4} \times \frac{94}{8} = \frac{4809}{8} = 601\frac{1}{8} \text{ Ans.}$$

$$6. 7\frac{1}{2} \times 5\frac{3}{8} = \frac{15}{2} \times \frac{43}{8} = \frac{645}{8} = 80\frac{5}{8} \text{ Ans.}$$

$$7. 7\frac{3}{8} \times 3\frac{1}{2} = \frac{59}{8} \times \frac{7}{2} = \frac{413}{8} = 51\frac{5}{8} \text{ Ans.}$$

$$8. 6\frac{7}{8} \times 23\frac{1}{2} = \frac{53}{8} \times \frac{47}{2} = \frac{2491}{4} = 622\frac{3}{4} \text{ Ans.}$$

$$9. 3\frac{1}{2} \times 9\frac{7}{8} = \frac{7}{2} \times \frac{19}{2} = \frac{133}{2} = 66\frac{1}{2} \text{ miles, Ans.}$$

$$10. 361\frac{1}{10} \times 25\frac{3}{8} = \frac{3611}{10} \times \frac{203}{8} = \frac{733033}{80} = 9162\frac{53}{80} \text{ Ans.}$$

$$11. 97\frac{5}{16} \times 49\frac{3}{7} = \frac{1557}{16} \times \frac{346}{7} = \frac{538702}{112} = 4809\frac{1}{112} \text{ rd. Ans.}$$

(ART. 159, p. 161.)

$$3. \frac{6}{13} \div 3 = \frac{2}{13} \text{ Ans.}$$

$$4. \frac{18}{19} \div 6 = \frac{3}{19} \text{ Ans.}$$

$$5. \frac{7}{11} \times 12 = \frac{84}{11} \text{ Ans.}$$

$$6. \frac{11}{12} \times 8 = \frac{11}{3} \text{ Ans.}$$

$$7. \frac{27}{43} \div 9 = \frac{3}{43} \text{ Ans.}$$

$$8. \frac{75}{98} \div 15 = \frac{5}{98} \text{ Ans.}$$

$$9. \frac{450}{533} \div 75 = \frac{6}{533} \text{ Ans.}$$

$$10. \frac{7}{9} \times 12 = \frac{28}{3} \text{ Ans.}$$

$$11. \frac{5}{7} \div 5 = \frac{1}{7} \text{ Ans.}$$

$$12. \frac{\frac{3}{9}}{23} \times \frac{15}{5} = 1\frac{3}{11} \text{ Ans.}$$

$$13. \frac{\frac{3}{6}}{17} \times \frac{28}{14} = 2\frac{3}{17} \text{ Ans.}$$

$$14. \frac{7}{7} - \frac{7}{7} = \frac{7}{7}; \frac{7}{7} \times \frac{1}{1} = \frac{7}{7}; \frac{7}{7} - \frac{7}{7} = \frac{10}{11}; \frac{10}{11} \div \frac{7}{7} = \frac{10}{11};$$

$$\$10,000 \div \frac{10}{11} = \$680\frac{10}{11} \text{ Ans.}$$

$$2. (\text{ART. 160, p. 161.}) 18 \times 8 = 144; 144 \div 7 = 20\frac{4}{7} \text{ Ans.}$$

$$3. 27 \times 12 = 324; 324 \div 11 = 29\frac{4}{11} \text{ Ans.}$$

$$4. 23 \times 4 = 92; 92 \div 1 = 92 \text{ Ans.}$$

$$5. 5 \times 5 = 25; 25 \div 1 = 25 \text{ Ans.}$$

$$6. 12 \times 4 = 48; 48 \div 3 = 16 \text{ Ans.}$$

$$7. 16 \times 2 = 32; 32 \div 1 = 32 \text{ Ans.}$$

$$8. 100 \times 19 = 1900; 1900 \div 17 = 111\frac{3}{17} \text{ Ans.}$$

$$9. 50 \times 5 = 250; 250 \div 3 = 83\frac{1}{3} \text{ Ans.}$$

$$10. 60 \times 11 = 660; 660 \div 9 = 73\frac{2}{3} \text{ minutes, Ans.}$$

$$2. (\text{ART. 161, p. 162.}) 17\frac{2}{3} \div 7 = 2\frac{2}{3} \text{ Ans.}$$

$$3. 18\frac{3}{4} \div 8 = 2\frac{1}{8} \text{ Ans.}$$

$$4. 27\frac{1}{2} \div 9 = 3\frac{1}{6} \text{ Ans.}$$

$$5. 31\frac{1}{6} \div 11 = 2\frac{5}{6} \text{ Ans.}$$

$$6. 78\frac{1}{2} \div 12 = 6\frac{3}{4} = 6\frac{3}{4} \text{ Ans.}$$

$$7. 189\frac{1}{2} \div 4 = 47\frac{3}{8} \text{ Ans.}$$

$$8. 107\frac{1}{2} \div 3 = 35\frac{5}{6} \text{ Ans.}$$

$$9. \$14\frac{3}{4} \div 7 = \$2\frac{1}{4} \text{ Ans.}$$

$$10. 106\frac{2}{3} \div 8 = \$13\frac{1}{2} \text{ Ans.}$$

$$11. 100 \times 25 = 2500; 2500 \div 72 = \$0.34\frac{1}{3} \text{ Ans.}$$

$$12. 3 \times 2 = 6; 6 + 4 = 10; 107\frac{1}{11} \div 10 = \$10\frac{4}{11}, \text{ boy's share; } \$10\frac{4}{11} \times 2 = \$21\frac{8}{11}, \text{ girl's share, Ans.}$$

$$13. \frac{1}{2} \text{ of a ton is 17 cwt.; and, if 17 cwt. be divided by 14, the quotient will be } 1\frac{3}{14} \text{ cwt. Ans.}$$

$$2. (\text{ART. 162, p. 163.}) 36 \times 8 = 288; 9\frac{7}{8} \times 8 = 79; 288 \div 79 = 3\frac{7}{79} \text{ Ans.}$$

$$3. 97 \times 12 = 1164; 13\frac{1}{2} \times 12 = 167; 1164 \div 167 = 6\frac{182}{167} \text{ [Ans.]}$$

$$4. 113 \times 7 = 791; 21\frac{1}{4} \times 7 = 148; 791 \div 148 = 5\frac{11}{148} \text{ Ans.}$$

$$5. 342 \times 131 = 44802; 14\frac{47}{131} \times 131 = 1881; 44802 \div 1881 = 23\frac{532}{1881} = 23\frac{2}{11} \text{ Ans.}$$

$$6. 19 \times 7 = 133; 2\frac{3}{7} \times 7 = 17; 133 \div 17 = 7\frac{14}{17} \text{ pieces;}$$

$$1\frac{1}{7} \times 2\frac{3}{7} = \frac{14}{17} \times \frac{17}{7} = \frac{2}{1} = 2\text{ft. Ans.}$$

(ART. 163, p. 164.)

$$2. \frac{7}{8} \times \frac{1}{4} = \frac{7}{32} = 1\frac{3}{8} \text{ Ans.}$$

$$3. \frac{7}{8} \times \frac{4}{1} = \frac{7}{2} = 3\frac{1}{2} \text{ Ans.}$$

$$4. \frac{13}{15} \times \frac{12}{11} = \frac{52}{55} \text{ Ans.}$$

$$5. \frac{2}{3} \times \frac{10}{3} = \frac{20}{9} = 2\frac{2}{9} \text{ Ans.}$$

$$6. \frac{2}{10} \times \frac{1}{1} = \frac{2}{10} = 6\frac{2}{10} \text{ Ans.}$$

$$7. \frac{4}{5} \times \frac{11}{2} = \frac{22}{5} = 4\frac{2}{5} \text{ Ans.}$$

$$8. \frac{9}{13} \times \frac{26}{3} = \frac{6}{1} = 6 \text{ Ans.}$$

$$9. \frac{19}{20} \times \frac{20}{7} = \frac{19}{7} = 2\frac{5}{7} \text{ Ans.}$$

$$10. \frac{2}{3} \times \frac{7}{8} = \frac{7}{12}; \frac{1}{7} \times \frac{2}{9} = \frac{2}{63}; \frac{7}{12} \times \frac{21}{2} = 14\frac{1}{2} = 18\frac{3}{8} \text{ Ans.}$$

$$11. \frac{4}{9} \times \frac{6}{11} \times \frac{7}{16} = \frac{7}{66}; \frac{2}{3} \times \frac{7}{4} \times \frac{1}{9} = \frac{7}{54}; \frac{7}{66} \times \frac{54}{7} = \frac{9}{11} \text{ [Ans.]}$$

$$12. \frac{3}{4} \times \frac{5}{7} \times \frac{4}{9} = \frac{5}{21}; \frac{2}{3} \times \frac{6}{7} \times \frac{2}{18} = \frac{4}{63}; \frac{5}{21} \times \frac{63}{4} = \frac{15}{4} = 3\frac{3}{4} \text{ Ans.}$$

$$2. (\text{ART. 164.}) 7\frac{3}{8} = \frac{59}{8}; 4\frac{1}{2} = \frac{9}{2}; \frac{59}{8} \times \frac{2}{9} = \frac{59}{36} = 1\frac{23}{36} \text{ Ans.}$$

$$3. 3\frac{1}{2} = \frac{7}{2}; 7\frac{1}{2} = \frac{15}{2}; \frac{7}{2} \times \frac{2}{15} = \frac{7}{15} \text{ Ans.}$$

$$4. 11\frac{1}{4} = \frac{45}{4}; 5\frac{3}{4} = \frac{23}{4}; \frac{45}{4} \times \frac{7}{38} = \frac{315}{152} = 2\frac{11}{152} \text{ Ans.}$$

$$5. 4\frac{3}{4} = \frac{19}{4}; 1\frac{7}{8} = \frac{9}{8}; \frac{19}{4} \times \frac{9}{18} = \frac{171}{72} = 2\frac{55}{72} \text{ Ans.}$$

$$6. 116\frac{3}{4} = \frac{467}{4}; 14\frac{1}{4} = \frac{57}{4}; \frac{467}{4} \times \frac{7}{99} = \frac{3269}{396} = 8\frac{223}{396} \text{ Ans.}$$

$$7. 81\frac{1}{4} = \frac{325}{4}; 9\frac{1}{2} = \frac{19}{2}; \frac{325}{4} \times \frac{5}{46} = \frac{1625}{188} = 8\frac{133}{188} \text{ Ans.}$$

$$8. \frac{2}{3} \times \frac{1}{2} \times \frac{7}{7} = \frac{231}{105}; \frac{5}{8} \times \frac{33}{10} = \frac{33}{16}; \frac{231}{10} \times \frac{7}{32} = \frac{1617}{320} = 5\frac{6}{320} = 11\frac{1}{8} \text{ [Ans.]}$$

(ART. 165, p. 165.)

$$(4.) \quad \frac{12}{7} = \frac{4}{1} \times \frac{7}{3} = 2\frac{2}{3} = 28 \text{ Ans.}$$

$$(5.) \quad \frac{7}{14} = \frac{7}{7} \times \frac{1}{2} = \frac{3}{8} \text{ Ans.}$$

$$(6.) \quad \frac{47}{9} = \frac{13}{8} \times \frac{1}{9} = 2\frac{3}{4} \text{ Ans.}$$

$$(7.) \quad \frac{3}{11} = \frac{3}{4} \times \frac{3}{11} = \frac{9}{11} \text{ Ans.}$$

$$(8.) \quad \frac{5}{7\frac{1}{4}} = \frac{5}{\frac{29}{4}} \times \frac{4}{31} = \frac{20}{31} \text{ Ans.}$$

$$(9.) \quad \frac{8\frac{3}{4}}{\frac{2}{5}} = \frac{35}{4} \times \frac{5}{2} = 17\frac{5}{8} = 21\frac{7}{8} \text{ Ans.}$$

$$(10.) \quad \frac{9\frac{3}{4}}{12\frac{1}{2}} = \frac{19}{5} \times \frac{2}{25} = \frac{38}{125} \text{ Ans.}$$

$$(11.) \quad \frac{9\frac{1}{4}}{12\frac{7}{8}} = \frac{37}{4} \times \frac{2}{103} \times \frac{1}{7} = \frac{74}{721} \text{ Ans.}$$

$$(12.) \quad \frac{3}{\frac{8}{\frac{1}{2}}} = \frac{3}{4} \times \frac{8}{8} \times \frac{1}{2} = \frac{3}{4} \text{ Ans.}$$

(ART. 166, p. 166.)

$$1. \frac{1}{3} = \frac{1}{3} \times \frac{7}{7} = \frac{7}{21}; \frac{4}{12\frac{1}{2}} = \frac{8}{25} \times \frac{2}{25} = \frac{16}{625}; \frac{7}{7} + \frac{16}{625} = 1\frac{16}{625} + \frac{16}{625} = 1\frac{32}{625} \text{ Ans.}$$

$$2. \frac{7\frac{3}{4}}{\frac{7}{4}} = \frac{31}{4} \times \frac{4}{1} = 31; \frac{7}{\frac{7}{2}} = \frac{7}{1} \times \frac{12}{7} = 12; 31 + 12 = 43; 43 \times \frac{1}{16} = \frac{43}{16} \text{ Ans.}$$

$$3. \frac{\frac{7}{8}}{\frac{1}{2}} = \frac{7}{8} \times \frac{2}{1} = \frac{7}{4}; \frac{1}{\frac{1}{2}} = 1 \times \frac{2}{1} = 2; \frac{7}{4} - 2 = \frac{7}{4} - \frac{8}{4} = -\frac{1}{4} \text{ Ans.}$$

$$4. \frac{6\frac{3}{4}}{\frac{1}{4}} = \frac{27}{4} \times \frac{4}{1} = 27; \frac{1}{\frac{1}{2}} = 1 \times \frac{2}{1} = 2; 27 - 2 = 25; 25 \times \frac{1}{27} = \frac{25}{27} \text{ Ans.}$$

$$5. \frac{1}{4} \times \frac{8\frac{1}{2}}{6\frac{2}{3}} \times \frac{7}{5} \times \frac{2}{16}; \frac{8\frac{1}{2}}{6\frac{2}{3}} = \frac{17}{12} \times \frac{5}{8} = \frac{85}{96}; \frac{1}{4} \times \frac{85}{96} \times \frac{7}{5} \times \frac{2}{16} = \frac{119}{384} \text{ Ans.}$$

$$6. \frac{3\frac{1}{2}}{5\frac{3}{4}} = \frac{7}{2} \times \frac{4}{23} = \frac{14}{23}; \frac{6\frac{1}{4}}{2\frac{5}{8}} = \frac{25}{4} \times \frac{8}{22} = \frac{25}{11}; \frac{225}{88} \times \frac{14}{23} = \frac{3150}{2024} \text{ Ans.}$$

$$7. \frac{7}{11} \times 12\frac{1}{2} = \frac{7}{11} \times \frac{1}{2} \times 25 = \frac{175}{22}; \frac{1}{7\frac{1}{2}} \times 8\frac{3}{4} = \frac{1}{15} \times \frac{35}{4} \times \frac{8}{1} = \frac{7}{2}; \frac{175}{22} \times \frac{7}{2} = \frac{1225}{44} \text{ Ans.}$$

(ART. 167, p. 167.)

$$2. \frac{3}{4}, \frac{5}{6}, 1\frac{1}{2} = \frac{3}{4}, \frac{5}{6}, \frac{3}{2}.$$

Greatest common divisor of 3, 5, 9 = 1  
 Least common multiple of 4, 6, 8 = 24 Ans.

$$3. \text{Greatest common divisor of } 12, 4, 8, 16 = 4 \text{ Ans.}$$

Least common multiple of 13, 7, 21, 39 = 273

4.  $1\frac{1}{5}, 2\frac{1}{4}, 4, 5\frac{1}{3} = 1\frac{1}{5}, \frac{2}{3}, \frac{4}{3}, \frac{19}{3}$ .  
 Greatest common divisor of  $15, 9, 4, 16 = 1$   
 Least common multiple of  $16, 4, 1, 3 = 48$  Ans.
5.  $166\frac{2}{3}, 156\frac{1}{4}, 208\frac{1}{3} = \frac{500}{3}, \frac{625}{4}, \frac{625}{3}$ .  
 Greatest common divisor of  $500, 625, 625 = 125$   
 Least common multiple of  $\frac{3}{3}, \frac{4}{4}, \frac{3}{3} = 12 = 10\frac{5}{12}$ .  
 $10\frac{5}{12} + \frac{1}{2} = 10\frac{11}{12}$  feet. Ans.

(ART. 168, p. 167.)

2. Least common multiple of  $10, 6, 15 = 30$   
 Greatest common divisor of  $28, 7, 35 = 7 = 4\frac{2}{7}$  Ans.
3.  $1\frac{1}{5}, 2\frac{1}{2}, 5, 6\frac{1}{3}, 11 = 1\frac{1}{5}, \frac{5}{2}, \frac{5}{1}, \frac{19}{3}, 11$ .  
 Least common multiple of  $1, 5, 5, 19, 1 = 95$   
 Greatest common divisor of  $15, 2, 1, 3, 11 = 1 = 95$  Ans.
4.  $1\frac{5}{8}, \frac{5}{8}, 1\frac{1}{2}, 2\frac{1}{4} = 1\frac{5}{8}, \frac{5}{8}, \frac{3}{2}, \frac{5}{2}$ .  
 Least common multiple of  $5, 5, 3, 9 = 45$   
 Greatest common divisor of  $16, 8, 2, 4 = 2 = \$22\frac{1}{2}$  Ans.  
 $\frac{4}{2} \div \frac{5}{16} = 72$  bushels of oats.  $\frac{4}{2} \div \frac{5}{8} = 36$  bushels of corn.  
 $\frac{4}{2} \div \frac{3}{2} = 15$  bushels of rye.  $\frac{4}{2} \div \frac{3}{4} = 10$  bushels of wheat.
5. Least common multiple of  $3, 7 = 21$   
 Greatest common divisor of  $4, 8 = \frac{4}{4} = 5\frac{1}{4}$  days.  
 $10 \div \frac{3}{4} = \frac{40}{3}$ ;  $\frac{40}{3} \times \frac{21}{4} = \frac{280}{3} = 70$  miles A.  
 $10 \div \frac{7}{8} = \frac{80}{7}$ ;  $\frac{80}{7} \times \frac{21}{4} = \frac{1680}{4} = 60$  miles B.

## MISCELLANEOUS EXERCISES IN VULGAR FRACTIONS.

(PAGE 169.)

1.  $76\frac{7}{5} = 15\frac{27}{5}$ ;  $18\frac{3}{4} = \frac{75}{4}$ ;  $\frac{1907}{25} \times \frac{75}{4} = \frac{5721}{4} = 1430\frac{1}{4}$ .  
 $= 8A. 3R. 30\frac{1}{4}p.$  Ans.

2.  $7\frac{3}{4} = \frac{31}{4}$ ;  $1\frac{3}{4} = \frac{7}{4}$ ;  $1\frac{1}{4} = \frac{5}{4}$ ;  $\frac{31}{4} \times \frac{7}{4} \times \frac{5}{4} \times \frac{10}{1} = \frac{1085}{2} = 169\frac{1}{2}$  cubic feet, Ans.
3.  $\frac{7}{11}$  of an acre = 2R. 21p. 222 $\frac{3}{4}$ ft. From this we subtract 20p. 200ft.; and there remain 2R. 1p. 22 $\frac{3}{4}$ ft. = 22075ft. Ans.
4.  $\frac{1}{13} \times \frac{160}{1} \times \frac{175}{1} = \frac{20800}{13} = \$236.92\frac{4}{13}$  Ans.
5.  $15\frac{3}{4} = \frac{63}{4}$ ;  $\frac{3}{19} \times \frac{20}{1} \times \frac{63}{4} = \frac{245}{19} = \$49.73\frac{1}{19}$ .
6.  $14\frac{2}{5} = \frac{72}{5}$ ;  $11\frac{3}{7} = \frac{80}{7}$ ;  $5\frac{4}{9} = \frac{49}{9}$ ;  $10\frac{1}{4} = \frac{41}{4}$ ;  $\frac{72}{5} \times \frac{80}{7} \times \frac{49}{9} \times \frac{41}{4} = 9184$  Ans.
7.  $7 - \frac{7}{2} = \frac{7}{2}$ ;  $\frac{7}{2} \times \frac{7}{2} = \frac{49}{4} = \frac{1}{4}$ ;  $\frac{1}{4} \times \frac{100}{1} = 25$ lb.;  $\$0.12\frac{3}{4} \times 25 = \$3.18\frac{3}{4}$  Ans.
8.  $19\frac{3}{7} = \frac{136}{7}$ ;  $7\frac{3}{8} = \frac{59}{8}$ ;  $\frac{136}{7} \times \frac{59}{8} = \frac{1003}{7} = \$143\frac{3}{7}$  Ans.
9.  $47\frac{5}{11} = \frac{522}{11}$ ;  $29\frac{7}{16} = \frac{471}{16}$ ;  $\frac{522}{11} \times \frac{471}{16} = \frac{122821}{8} = 1396\frac{3}{8}$  square rods;  $5 \times 5 = 25$ ;  $25 + 5 = 30$ ;  $1396\frac{3}{8} - 30 = 1366\frac{3}{8}$  square rods, Ans.
10.  $175\frac{3}{5} = \frac{878}{5}$ ;  $\frac{8}{5} - \frac{2}{5} = \frac{6}{5}$ ;  $\frac{878}{5} \times \frac{6}{5} = \frac{1756}{5}$ ;  $\frac{3}{8} - \frac{2}{8} = \frac{1}{8}$ ;  $\frac{1756}{5} \times \frac{1}{8} = \frac{1756}{40} = \frac{439}{10}$ ;  $8\frac{3}{4} = \frac{35}{4}$ ;  $\frac{439}{10} \times \frac{35}{4} = \frac{3073}{8} = \$2.04\frac{1}{8}$  Ans.



11.  $475 \div 3 = 158\frac{1}{3}$ ;  $158\frac{1}{3} \times .08 = \$12.66\frac{2}{3}$ ;  $475 - 158\frac{1}{3} = 316\frac{2}{3}$ ;  $\frac{2}{3} \times 316\frac{2}{3} = 211\frac{1}{3}$ ;  $211\frac{1}{3} \times .10 = \$21.11\frac{1}{3}$ ;  $316\frac{2}{3} - 211\frac{1}{3} = 105\frac{1}{3}$ ;  $105\frac{1}{3} \times .12 = \$13.19\frac{1}{3}$  Ans.  $\$21.11\frac{1}{3} + \$12.66\frac{2}{3} + \$13.19\frac{1}{3} = \$46.97\frac{2}{3}$ ;  $\$46.97\frac{2}{3} - \$30.00 = \$16.97\frac{2}{3}$ , Green's bargain, Ans.

$$12. 14\frac{7}{8} = 14\frac{1}{2}; \frac{14}{101} \times \frac{101}{7} = \$2.00 \text{ Ans.}$$

$$13. \frac{7}{8} \times \frac{8}{11} \times \frac{11}{14} = \frac{1}{2}; \frac{5}{17} \times \frac{17}{19} \times \frac{19}{25} = \frac{1}{5}; \frac{1}{2} \times \frac{1}{5} = \frac{1}{10} \text{ Ans.}$$

$$14. 11\frac{1}{2} = \frac{17}{2}; 4\frac{1}{2} = \frac{17}{4}; \frac{17}{2} \times \frac{17}{4} = \frac{289}{8} = 49\frac{1}{8} \text{ sq. in. Ans.}$$

$$15. \$17.87\frac{1}{2} \div 2 = \$8.93\frac{1}{4}. \text{ Now, if } \frac{2}{5} \text{ of this sum were given to the Bible Society, } \frac{3}{5} \text{ of it will remain; therefore, } \$8.93\frac{1}{4} \times \frac{3}{5} = \$5.357\frac{1}{4} \text{ Ans.}$$

$$16. 10\frac{4}{5} = \frac{54}{5}; 50 \times 5 = 250; 250 \div 54 = 4\frac{1}{27}; 12\frac{1}{2} - 4\frac{1}{27} = 8\frac{13}{27} \text{ Ans.}$$

$$17. 7\frac{3}{8} = \frac{57}{8}; 20 \times 8 = 160; 160 \div 59 = 2\frac{2}{59} \text{ Ans.}$$

$$18. 8\frac{1}{2} = \frac{17}{2}; 3\frac{1}{2} = \frac{7}{2}; 2\frac{1}{2} = \frac{5}{2}; \frac{17}{2} \times \frac{7}{2} \times \frac{5}{2} = \frac{595}{4} = 68\frac{3}{4} \text{ feet, Ans.}$$

19. If  $\frac{2}{3}$  of this field be planted with corn,  $\frac{1}{3}$  of the field will remain unplanted. And, if  $\frac{2}{3}$  of this remainder be sown with wheat, then there will remain  $\frac{1}{3}$  of the whole field; because, if  $\frac{2}{3}$  of  $\frac{1}{3} = \frac{2}{9}$  be taken from  $\frac{1}{3}$ , the remainder will be  $\frac{1}{9}$ ; thus,  $\frac{1}{3} = \frac{3}{9} - \frac{2}{9} = \frac{1}{3}$ . If, then,  $\frac{2}{3}$  of this  $\frac{1}{3}$  be planted with potatoes,  $\frac{1}{9}$  of the  $\frac{1}{3}$  will remain; and  $\frac{1}{9}$  of  $\frac{1}{3}$  is  $\frac{1}{27}$ . That is, the 3 rods square and the 3 square rods are  $\frac{4}{9}$  of the whole field; but 3 rods square are 9 square rods; and if to these we add the 3 square rods, the whole amount will be 12 square rods. If, then, 12 square rods be  $\frac{4}{9}$  of the field, 3 square rods will be  $\frac{1}{3}$  of the field; and, if  $\frac{1}{3}$  of the field be 3 rods,  $\frac{2}{3}$ , or the whole field, will be 63 times as much, that is,  $63 \times 3 = 189$  square rods = 1A. 0R. 29p. Ans.

$$2. \text{ (ART. 169, p. 171.) } \frac{1}{\frac{1400}{70} \frac{35}{1}} \times \frac{20}{1} \times \frac{12}{1} \times \frac{2}{1} = \frac{2}{3} \text{ Ans.}$$

$$3. \frac{4}{\frac{75}{25}} \times \frac{12}{1} = \frac{2}{3} \text{ Ans.}$$

$$4. \frac{1}{\frac{8640}{720} \frac{36}{3}} \times \frac{12}{1} \times \frac{20}{1} \times \frac{24}{1} = \frac{2}{3} \text{ Ans.}$$

$$5. \frac{1}{\frac{1728}{432} \frac{27}{1}} \times \frac{4}{1} \times \frac{25}{1} \times \frac{16}{1} = \frac{2}{3} = \frac{2}{3} \text{ Ans.}$$

$$6. \frac{1}{\frac{1320}{33} \frac{2}{1}} \times \frac{40}{1} \times \frac{16\frac{1}{2}}{1} = \frac{1}{2} \text{ Ans.}$$

$$7. \frac{1}{\frac{58080}{363}} \times \frac{160}{1} \times \frac{272\frac{1}{4}}{1} = \frac{272\frac{1}{4}}{363} = \frac{1088}{1452} = \frac{2}{3} \text{ Ans.}$$

$$8. \frac{1}{\frac{89600}{11200} \frac{28}{1}} \times \frac{24}{1} \times \frac{60}{1} \times \frac{60}{1} = \frac{2}{3} \text{ Ans.}$$

$$9. \frac{3}{\frac{14}{7}} \times \frac{4}{1} = \frac{2}{3} \text{ Ans.}$$

$$10. \frac{1}{\frac{200}{50} \frac{2}{1}} \times \frac{4}{1} \times \frac{25}{1} = \frac{1}{2} \text{ Ans.}$$

$$2. (\text{ART. 170, p. 171.}) \frac{4}{7} \times \frac{1}{\frac{24}{6}} \times \frac{1}{20} \times \frac{1}{12} = \frac{1}{1050} \text{ Ans.}$$

$$3. \frac{3}{10} \times \frac{1}{3} \times \frac{1}{8} = \frac{1}{80} \text{ Ans.}$$

$$4. \frac{4}{5} \times \frac{1}{\frac{16}{4}} \times \frac{1}{25} \times \frac{1}{4} \times \frac{1}{20} = \frac{1}{4000} \text{ Ans.}$$

$$5. \frac{8}{9} \times \frac{1}{40} \times \frac{1}{8} = \frac{1}{360} \text{ Ans.}$$

$$6. \frac{2}{3} \times \frac{1}{272\frac{1}{2}} \times \frac{1}{40} \times \frac{1}{\frac{4}{2}} = \frac{1}{85340} \text{ Ans.}$$

$$7. \frac{24}{25} \times \frac{1}{60} \times \frac{1}{60} \times \frac{1}{24} = \frac{1}{9000} \text{ Ans.}$$

$$8. \frac{4}{9} \times \frac{1}{272\frac{1}{2}} \times \frac{1}{40} \times \frac{1}{4} \times \frac{1}{3} = \frac{1}{294030} \text{ Ans.}$$

$$9. \frac{4}{7} \times \frac{1}{4} \times \frac{1}{63} \times \frac{1}{3} = \frac{1}{1323} \text{ Ans.}$$

10. A solid foot contains 1728 cubic inches, and  $\frac{1}{6}$  of 1728 is 288.  
 One sixth of a yard is 6 inches, and a cube whose sides measure 6 inches each contains  $6 \times 6 \times 6 = 216$  cubic inches, and 216 is  $\frac{3}{4}$  of 288; thus,  $\frac{216}{288} = \frac{3}{4}$  Ans.

(ART. 171, p. 173.)

(2.)	(3.)	(4.)	(Brought up.)
7	7	3	
4	4	4	
9)28(3qr.	9)28(3qr.	7)12(1R.	7)1089(155ft.
27	27	7	7
1	1	5	38
25	4	40	35
9)25(2lb.	9)4(0 $\frac{1}{2}$ na.	7)200(28p.	39
18		14	35
7		60	4
16		56	144
9)112(12oz.		4	7)576(82 $\frac{1}{2}$ in.
9		272 $\frac{1}{2}$	56
22		1089	16
18	(Carried up.)		14
4			2
16			
9)64(7 $\frac{1}{2}$ dr.			
63			
1			
(5.)	(6.)	(7.)	
2	3	2	
8	5	63	
9)16(1fur.	11)15(1qr.	7)126(18gal.	
9	11	7	
7	4	56	
40	4	56	
9)280(31rd.	11)16(1 $\frac{5}{11}$ na.		
27	11		
10	5		
9	(Brought up.)		
1	7 $\frac{1}{2}$		
16 $\frac{1}{2}$	12		
9)16 $\frac{1}{2}$ (1ft.	9)90(10in.		
9	90		
7 $\frac{1}{2}$ (Carried up.)			
6			

(8.)

$$\begin{array}{r}
 7 \\
 365\frac{1}{4} \\
 11)2556\frac{3}{4}(232d. \\
 \underline{22} \\
 35 \\
 33 \\
 \underline{26\frac{3}{4}} \\
 22 \\
 \underline{4\frac{3}{4}} \\
 24 \\
 96 \\
 18 \\
 11)114(10h. \\
 \underline{110} \\
 4 \text{ (Carried up.)}
 \end{array}$$

$$\begin{array}{r}
 4 \text{ (Brought up.)} \\
 60 \\
 11)240(21m. \\
 \underline{22} \\
 20 \\
 11 \\
 9 \\
 60 \\
 11)540(49\frac{1}{4}s. \\
 \underline{44} \\
 100 \\
 99 \\
 \underline{1}
 \end{array}$$

(ART. 172, p. 173.)

(2.)

$$\begin{array}{l}
 4s. 8d. = 56 \\
 1\text{£}. = 240 = \frac{56}{240} \text{ Ans.}
 \end{array}$$

(3.)

$$\begin{array}{l}
 4\text{cwt. } 3\text{qr. } 12\text{lb.} = 487 \\
 1\text{T.} = 2000 \text{ Ans.}
 \end{array}$$

(4.)

$$\begin{array}{l}
 2 \text{ fur. } 30\text{rd.} = 110 \\
 2\text{m. } 3 \text{ fur. } 20\text{rd.} = 780 = \frac{110}{780} \text{ Ans.}
 \end{array}$$

(5.)

$$\begin{array}{l}
 3\text{R. } 24\text{p.} = 144 \\
 2\text{A. } 2\text{R. } 32\text{p.} = 432 = \frac{144}{432} \text{ Ans.}
 \end{array}$$

(6.)

$$\begin{array}{l}
 18\text{gal. } 2\text{qt.} = 74 \\
 1\text{hhd.} = 252 = \frac{74}{252} \text{ Ans.}
 \end{array}$$

(7.)

$$\begin{array}{l}
 8\text{d. } 17\text{h. } 20\text{m.} = 12560 \\
 30\text{d.} = 43200 = \frac{12560}{43200} \text{ Ans.}
 \end{array}$$

(8.)

$$\begin{array}{l}
 5\text{yd. } 2\text{qr. } 2\text{na.} = 90 \\
 13\text{yd. } 0\text{qr. } 2\text{na.} = 210 = \frac{90}{210} \text{ Ans.}
 \end{array}$$

(9.)

$$\begin{array}{l}
 3\text{yd.} = 3 \\
 3\text{yd.} \times 3\text{yd.} = 9 = \frac{3}{9} \text{ Ans.}
 \end{array}$$

(2.)

(ART. 173, p. 174.)

(3.)

$$\begin{array}{r}
 \text{s.} \quad \text{d.} \quad \text{far.} \\
 1\text{£}. = 7 \quad 3 \quad 1\frac{1}{4} \\
 \frac{1}{2}s. = \quad 8 \quad 2\frac{1}{2} \\
 \hline
 \text{Ans. } 7 \quad 11 \quad 3\frac{3}{4}
 \end{array}$$

$$\begin{array}{r}
 \text{T.} \quad \text{cwt.} \quad \text{qr.} \quad \text{lb.} \\
 \frac{1}{4}\text{T.} = 18 \quad 0 \quad 18\frac{1}{4} \\
 \frac{1}{2}\text{T.} = 15 \quad 2 \quad 5\frac{1}{2} \\
 \frac{3}{4}\text{cwt.} = \quad 2 \quad 7\frac{1}{2} \\
 \hline
 \text{Ans. } 1 \quad 14 \quad 1 \quad 5\frac{1}{4}
 \end{array}$$

(4.)

	yd.	qr.	na.	in.
$\frac{3}{8}$ yd. =	2	2	$1\frac{1}{2}$	
$\frac{5}{8}$ yd. =	3	2	$0\frac{1}{2}$	
$\frac{4}{11}$ qr. =		1	$1\frac{1}{4}$	
Ans.	1	2	2	$0\frac{1}{2}$

(5.)

	fur.	rd.	yd.	ft.	in.
$\frac{4}{11}$ m. =	2	36	2	0	0
$\frac{4}{8}$ m. =	3	22	1	0	8
$\frac{3}{11}$ fur. =		10	5	0	0
$\frac{7}{11}$ yd. =				1	$10\frac{1}{11}$
	6	29	$2\frac{1}{2}$	2	$6\frac{1}{11}$
			$\frac{1}{2}=1$	6	
Ans.	6	29	3	1	$0\frac{1}{11}$

(6.)

	A.	R.	p.	ft.	in.
$\frac{9}{11}$ A. =		3	10	247	72
$\frac{4}{8}$ R. =			0	194	$66\frac{2}{3}$
$\frac{3}{7}$ p. =			32	0	0
	1	0	3	$168\frac{3}{4}$	$138\frac{2}{3}$
				$\frac{3}{4}=108$	
Ans.	1	0	3	169	$102\frac{2}{3}$

(7.)

	R.	p.	ft.
$\frac{4}{7}$ A. =	0	37	$176\frac{1}{4}$
$\frac{1}{7}$ A. =	0	22	$233\frac{5}{4}$
$\frac{2}{11}$ A. =	0	29	$24\frac{3}{4}$
$\frac{3}{7}$ A. =	1	28	$155\frac{1}{4}$
Ans.	3	38	$45\frac{81}{38}$

(ART. 174, p. 175.)

(2.)

	cwt.	qr.	lb.
$\frac{4}{7}$ T. =	11	1	$17\frac{2}{3}$
$\frac{6}{17}$ cwt. =		1	$10\frac{5}{17}$
Ans.	11	0	$7\frac{67}{119}$

(3.)

	fur.	rd.	ft.	in.
$\frac{7}{8}$ m. =	6	8	14	8
$\frac{7}{8}$ fur. =		15	9	2
Ans.	5	33	5	6

(5.)

	gal.	qt.	pt.
$\frac{3}{11} \times 100$ gal.	= 27	1	$0\frac{2}{11}$
$11 - \frac{3}{11} = \frac{9}{11} \times \frac{2}{3} = \frac{12}{11} \times 100$ gal. =	48	1	$12\frac{8}{11}$
	75	3	$0\frac{2}{3}$
	100	0	0
	75	3	$0\frac{2}{3}$
Ans.	24	0	$1\frac{2}{3}$

(4.)

	R.	p.	ft.
$\frac{10}{11}$ A. =	3	25	$123\frac{3}{4}$
$\frac{2}{8}$ R. =		8	242
Ans.	3	16	154

(6.)

	m.	fur.	rd.	ft.	in.
$41\text{m.} \times \frac{3}{11}$	= 11	1	18	3	0
$\frac{11}{11} - \frac{3}{11} = \frac{8}{11} \times \frac{1}{4} = \frac{2}{11} \times 41\text{m.}$	= 17	0	12	7	$8\frac{4}{11}$
	28	1	30	10	$8\frac{4}{11}$
	41	0	0	0	0
	28	1	30	10	$8\frac{4}{11}$
Ans.	12	6	9	5	$9\frac{3}{11}$

(7.)

	da.	h.	m.	s.
$365\text{da.} \times \frac{1}{7}$	= 52	3	25	$42\frac{5}{7}$
$\frac{1}{7} - \frac{1}{7} = \frac{6}{7} \times \frac{3}{11} = \frac{18}{77} \times 365\text{da.}$	= 85	7	47	$31\frac{13}{77}$
Ans.	137	11	13	$14\frac{5}{77}$

(8.)

$$\begin{aligned}
 11\text{A. } 33\text{p. } 101\frac{1}{6}\text{ft.} &= 488245\frac{5}{6}\text{ft.}; \\
 488245\frac{5}{6}\text{ft.} \times \frac{2}{3} \times \frac{2}{3} &= 130198\frac{2}{3}\text{ft.}; \\
 144 \times 144 \times 4 &= 82944\text{ft.}; \\
 130198\frac{2}{3} - 82944 &= 47254\frac{2}{3}\text{ft.}; \\
 47254\frac{2}{3} \times .08\frac{1}{3} &= \$3937.89 + \text{Ans.}
 \end{aligned}$$

### QUESTIONS PERFORMED BY ANALYSIS.

2. (p. 176.)  $\$7.80 \div 10 = \$0.78$ ;  $\$0.78 \times 3 = \$2.34$  Ans.
3.  $\$17.84 \div 8 = \$2.23$ ;  $\$2.23 \times 7 = \$15.61$  Ans.
4.  $\$786.63 \div 13 = \$60.51$ ;  $\$60.51 \times 11 = \$665.61$  Ans.
5.  $\$87.50 \div 12 = \$7.29\frac{1}{6}$ ;  $\$7.29\frac{1}{6} \times 11 = \$80.20\frac{5}{6}$  Ans.
6.  $17\text{£. } 18\text{s. } 9\text{d.} \div 4 = 4\text{£. } 9\text{s. } 8\frac{1}{4}\text{d.}$ ;  $4\text{£. } 9\text{s. } 8\frac{1}{4}\text{d.} \times 3 = 13\text{£. } 9\text{s. } 0\frac{3}{4}\text{d.}$  Ans.
7.  $3\text{T. } 16\text{cwt. } 3\text{qr. } 23\text{lb.} \div 7 = 10\text{cwt. } 3\text{qr. } 24\frac{1}{7}\text{lb.}$ ;  $10\text{cwt. } 3\text{qr. } 24\frac{1}{7}\text{lb.} \times 4 = 2\text{T. } 3\text{cwt. } 3\text{qr. } 23\frac{1}{7}\text{lb.}$  Ans.

8. 27A. 3R. 33p.  $\div 9 = 3A. 0R. 17p.$ ;  $3A. 0R. 17p. \times 4 = 12A. 1R. 28p.$  Ans.
10.  $\$ 2.34 \div 3 = \$ 0.78$ ;  $\$ 0.78 \times 10 = \$ 7.80$  Ans.
11.  $\$ 15.57\frac{1}{2} \div 7 = \$ 2.22\frac{1}{2}$ ;  $\$ 2.22\frac{1}{2} \times 8 = \$ 17.80$  Ans.
12.  $\$ 665.50 \div 11 = \$ 60.50$ ;  $\$ 60.50 \times 13 = \$ 786.50$  Ans.
13.  $\$ 73.60\frac{5}{8} \div 11 = \$ 6.69\frac{1}{8}$ ;  $\$ 6.69\frac{1}{8} \times 12 = \$ 80.30$  Ans.
14.  $13\text{£. } 9\text{s. } 0\frac{3}{4}\text{d.} \div 3 = 4\text{£. } 9\text{s. } 8\frac{1}{4}\text{d.}$ ;  $4\text{£. } 9\text{s. } 8\frac{1}{4}\text{d.} \times 4 = 17\text{£. } 18\text{s. } 9\text{d.}$  Ans.
15.  $18\text{cwt. } 0\text{qr. } 12\text{lb.} \div 4 = 4\text{cwt. } 2\text{qr. } 3\text{lb.}$ ;  $4\text{cwt. } 2\text{qr. } 3\text{lb.} \times 17 = 77\text{cwt. } 0\text{qr. } 11\text{lb.}$  Ans.
16.  $12A. 1R. 30\frac{7}{8}\text{p.} \div 4 = 3A. 0R. 17\frac{3}{8}\text{p.}$ ;  $3A. 0R. 17\frac{3}{8}\text{p.} \times 9 = 27A. 3R. 39\frac{1}{4}\text{p.}$  Ans.
17.  $\$ 80.20\frac{5}{8} \div 11 = \$ 7.29\frac{1}{8}$ ;  $\$ 7.29\frac{1}{8} \times 12 = \$ 87.50$  Ans.
19.  $\$ 2.52 \div 7 = \$ 0.36$ ;  $\$ 0.36 \times 11 = \$ 3.96$ ;  $\$ 3.96 \div 9 = \$ 0.44$ ;  $\$ 0.44 \times 4 = \$ 1.76$  Ans.
20.  $\$ 80.00 \div 3 = \$ 26.66\frac{2}{3}$ ;  $\$ 26.66\frac{2}{3} \times 4 = \$ 106.66\frac{2}{3}$ ;  $\$ 106.66\frac{2}{3} \div 8 = \$ 13.33\frac{1}{3}$ ;  $\$ 13.33\frac{1}{3} \times 7 = \$ 93.33\frac{1}{3}$  Ans.
21.  $\$ 631.89 \div 9 = \$ 70.21$ ;  $\$ 70.21 \times 16 = \$ 1123.36$ ;  $\$ 1123.36 \div 14 = \$ 80.24$ ;  $\$ 80.24 \times 5 = \$ 401.20$  Ans.
22.  $\$ 141.52 \div 4 = \$ 35.38$ ;  $\$ 35.38 \times 5 = \$ 176.90$ ;  $\$ 176.90 \div 29 = \$ 6.10$ ;  $\$ 6.10 \times 5 = \$ 30.50$  Ans.
23.  $\$ 1728 \div 3 = \$ 576$ ;  $\$ 576 \times 8 = \$ 4608$ ;  $\frac{5}{8} - \frac{3}{8} = \frac{2}{8}$ ;  $\frac{5}{8} \times \frac{4}{5} = \frac{1}{2}$ ;  $\$ 4608 \times \frac{1}{2} = \$ 2304$  Ans.
24.  $\$ 82.80 \div 4 = \$ 20.70$ ;  $\$ 20.70 \times 7 = \$ 144.90$ ;  $\frac{7}{7} - \frac{4}{7} = \frac{3}{7}$ ;  $\frac{3}{7} \times \frac{2}{3} = \frac{2}{7}$ ;  $\$ 144.90 \div 7 = \$ 20.70$ ;  $\$ 20.70 \times 2 = \$ 41.40$  Ans.
25.  $26\text{£. } 12\text{s. } 6\text{d.} \div 5 = 5\text{£. } 6\text{s. } 6\text{d.}$ ;  $5\text{£. } 6\text{s. } 6\text{d.} \times 9 = 47\text{£. } 18\text{s.}$   $6\text{d.}$ ;  $\frac{3}{9} - \frac{1}{9} = \frac{2}{9}$ ;  $\frac{4}{9} \times \frac{7}{8} = \frac{7}{18}$ ;  $47\text{£. } 18\text{s. } 6\text{d.} \div 18 = 2\text{£. } 13\text{s. } 3\text{d.}$ ;  $2\text{£. } 13\text{s. } 3\text{d.} \times 7 = 18\text{£. } 12\text{s. } 9\text{d.}$  Ans.



27.  $\$49.00 \div 3 = \$16.33\frac{1}{3}$ ;  $\$16.33\frac{1}{3} \div 11 = \$1.48\frac{1}{3}$   
 $\$1.48\frac{1}{3} \times 81 = \$120.27\frac{3}{4}$  Ans.
28.  $\$78.80 \div 11 = \$7.16\frac{4}{11}$ ;  $\$7.16\frac{4}{11} \div 9 = \$0.79\frac{2}{9}$ ;  
 $\$0.79\frac{2}{9} \times 31 = \$24.67\frac{1}{3}$  Ans.
29.  $37\text{£. } 18\text{s. } 10\text{d.} \div 3 = 12\text{£. } 12\text{s. } 11\frac{1}{3}\text{d.}$ ;  $12\text{£. } 12\text{s. } 11\frac{1}{3}\text{d.} \div$   
 $8 = 1\text{£. } 11\text{s. } 7\frac{1}{2}\text{d.}$ ;  $1\text{£. } 11\text{s. } 7\frac{1}{2}\text{d.} \times 43 = 67\text{£. } 19\text{s. } 6\frac{1}{2}\text{d.}$  Ans.
30.  $\$40 \div 5 = \$8.00$ ;  $\$8.00 \div 7 = \$1.14\frac{2}{7}$ ;  $\$1.14\frac{2}{7} \times 137$   
 $= \$156.57\frac{1}{7}$  Ans.
31.  $\$360 \div 20 = \$18$ ;  $\$18 \div 6 = \$3$ ;  $\$3 \times 263 = \$789$   
 Ans.
32.  $\$8.75 \div 7 = \$1.25$ ;  $\$1.25 \div 11 = \$0.11\frac{4}{11}$ ;  $\$0.11\frac{4}{11}$   
 $\times 205 = \$23.29\frac{8}{11}$  Ans.
33.  $\$19.80 \div 3 = \$6.60$ ;  $\$6.60 \div 7 = \$0.94\frac{2}{7}$ ;  $\$0.94\frac{2}{7} \times$   
 $81 = \$76.37\frac{1}{7}$  Ans.
35.  $3\text{cwt.} \div 151 = \frac{2}{151}$ ;  $\frac{2}{151} \times \frac{3}{4} = \frac{3}{302}$ ;  $\frac{3}{302} \times \frac{1}{4} = \frac{1}{402\frac{2}{3}}$   
 $= 12\frac{2}{3}\text{cwt.}$  Ans.
36.  $\$276.18 \div 24 = \$11.50\frac{3}{4}$ ;  $\$11.50\frac{3}{4} \times 7 = \$80.55\frac{1}{4}$ ;  
 $\$80.55\frac{1}{4} \times 75 = \$6041.43\frac{3}{4}$  Ans.
37.  $\$875.00 \div 81 = \$10.80\frac{20}{81}$ ;  $\$10.80\frac{20}{81} \times 11 = \$118.-$   
 $82\frac{20}{81}$ ;  $\$118.82\frac{20}{81} \times 75 = \$8912.03\frac{2}{3}$  Ans.
38.  $\$70 \div 35 = \$2$ ;  $\$2 \times 8 = \$16$ ;  $\$16 \times 86 = \$1376$   
 Ans.
39.  $\$375.00 \div 111 = \$3.37\frac{23}{111}$ ;  $\$3.37\frac{23}{111} \times 4 = \$13.51\frac{32}{111}$ ;  
 $\$13.51\frac{32}{111} \times 69 = \$932.43\frac{2}{3}$  Ans.
40.  $\$80.50 \div 23 = \$3.50$ ;  $\$3.50 \times 5 = \$17.50$ ;  $\$17.50 \times$   
 $15 = \$262.50$  Ans.
41.  $\$62.37 \div 81 = \$0.77$ ;  $\$0.77 \times 11 = \$8.47$ ;  $\$8.47 \times$   
 $19 = \$160.93$  Ans.
43.  $\$668.50 \div 191 = \$3.50$ ;  $\$3.50 \times 11 = \$38.50$ ;  $\$38.50$   
 $\div 5 = \$7.70$ ;  $\$7.70 \times 449 = \$3457.30$  Ans.
44.  $\$1738 \div 79 = \$22$ ;  $\$22 \times 4 = \$88$ ;  $\$88 \div 11 =$   
 $\$8$ ;  $\$8 \times 411 = \$3288$  Ans.
45.  $1128\text{ft.} \div 47 = 24$ ;  $24 \times 4 = 96$ ;  $96 \div 8 = 12$ ;  $8 \times$   
 $1435 = 11480$  feet, Ans.

$$46. 116\text{cwt.} \div 29 = 4; 4 \times 8 = 32; 32 \div 4 = 8; 8 \times 47 = 376\text{cwt. Ans.}$$

$$47. 376 \div 47 = 8; 8 \times 4 = 32; 32 \div 8 = 4; 4 \times 29 = 116\text{cwt. Ans.}$$

$$48. \$8 \div 10 = \frac{4}{5}; \frac{4}{5} \times 7 = \frac{28}{5}; \frac{28}{5} \times \frac{1}{4} = \frac{7}{5}; \frac{7}{5} \times \frac{35}{1} = \$49 \text{ Ans.}$$

$$49. \$414 \div 207 = \$2; \$2 \times 10 = \$20; \$20 \div 5 = \$4; \$4 \times 59 = \$236 \text{ Ans.}$$

MISCELLANEOUS QUESTIONS BY ANALYSIS.

$$1. (\text{P. 179.}) \$896.50 \div 11 = \$81.50; \$81.50 \times 10 = \$815 \text{ Ans.}$$

$$2. \$17\frac{3}{4} \div 3 = \$5\frac{3}{4}; \$5\frac{3}{4} \times 37 = \$213.03\frac{1}{3} \text{ Ans.}$$

$$3. \$3687 \div 8 = \$460.87\frac{1}{2}; \$460.87\frac{1}{2} \times 7 = \$3226.12\frac{1}{2} \text{ Ans.}$$

$$4. 17\frac{7}{12} = 21\frac{1}{12}; 187\frac{3}{8} = 148\frac{3}{8}; 148\frac{3}{8} \div 21\frac{1}{12} = \frac{1499}{8} \times \frac{3}{211} = \frac{4497}{2854}; \frac{4497}{2854} \times \frac{5}{7} = \frac{22485}{25984} = \$7.61\frac{253}{1477} \text{ Ans.}$$

$$5. \$13\frac{7}{8} = 11\frac{1}{8}; 11\frac{1}{8} \times 1\frac{1}{5} = 12\frac{3}{4} = \$30.52\frac{1}{2} \text{ Ans.}$$

$$6. \$37\frac{3}{11} = 41\frac{0}{11}; 41\frac{0}{11} \div 100 = 41\frac{0}{110}; 41\frac{0}{110} \times \frac{1}{4} = 10\frac{3}{110} = \$0.21\frac{3}{11} \text{ Ans.}$$

$$7. \$0.12 \times \frac{1}{4} = 13\frac{2}{100}; 48\frac{7}{13} = 63\frac{1}{13}; \frac{132}{4} \times \frac{631}{13} = \frac{20822}{13} = \$16.01\frac{18}{13} \text{ Ans.}$$

$$8. \$3\frac{7}{8} = 2\frac{3}{8}; 6\frac{3}{8} = 3\frac{3}{8}; 2\frac{3}{8} \times \frac{3}{4} = 2\frac{9}{8}; 2\frac{9}{8} \times \frac{3}{5} = 6\frac{27}{40} = \$48\frac{111}{110} \text{ Ans.}$$

$$9. \$236 \div 11\frac{4}{5} = \frac{236}{1} \times \frac{5}{59} = \$20; \$20 \times 20\frac{7}{10} = \$414 \text{ [Ans.]}$$

$$10. 97\frac{7}{8} \div 3 = 32\frac{1}{2}; 1073\frac{7}{8} \div 32\frac{1}{2} = \frac{7513}{7} \times \frac{3}{625} = 33 \text{ bales, Ans.}$$

$$11. \$48\frac{11}{16} \div 6\frac{1}{2} = \frac{6831}{140} \div \frac{33}{5} = \frac{6831}{140} \times \frac{5}{33} = \frac{227}{28}; \frac{23}{28} \times \frac{4}{9} = \frac{23}{63} = \$3.28\frac{4}{5} \text{ Ans.}$$

$$12. 34 \div 3\frac{1}{2} = 34 \times \frac{2}{7} = \frac{102}{7}; \frac{102}{7} \times 74\frac{1}{2} = \frac{102}{11} \times \frac{149}{2} = 711\frac{2}{11} = \$6.90\frac{2}{11} \text{ Ans.}$$

$$13. \$63 \div 2\frac{1}{2} = 63 \div \frac{5}{2} = \frac{63}{1} \times \frac{2}{5} = \frac{126}{5}; \frac{126}{5} \times \frac{148}{9} = 381\frac{1}{3} \text{ Ans.}$$

$$14. \$17\frac{4}{11} \div (3 \times 3) = \$17\frac{4}{11} \div 9 = \$1\frac{8}{11}; \$1\frac{8}{11} \times 4 = \$7\frac{1}{3} \text{ Ans.}$$

$$15. \$31\frac{1}{4} = 22\frac{1}{4}; 2\frac{1}{8} = \frac{17}{8}; 22\frac{1}{4} \div \frac{17}{8} = \frac{221}{7} \times \frac{6}{17} = 7\frac{8}{7};$$

$$689\frac{1}{3} = 229\frac{1}{3}; \frac{78}{7} \times \frac{8961}{13} = \frac{53766}{1} = \$7680\frac{6}{7} \text{ Ans.}$$

$$16. \$63 \div 6\frac{1}{2} = \frac{63}{1} \div \frac{13}{2} = \frac{63}{1} \times \frac{2}{13} = \frac{126}{13}; \frac{189}{20} \times \frac{18}{1} = 170\frac{1}{10} = \$170.10 \text{ Ans.}$$

$$17. \$243\frac{1}{11} = 22\frac{1}{11}; 2\frac{1}{11} \div 22\frac{1}{11} = \frac{96}{1} \times \frac{11}{2674} = \frac{538}{1337}; \$1000 \times \frac{538}{1337} = 394\frac{1}{1337} \text{ barrels, Ans.}$$

$$18. 83\frac{2}{5} = 133\frac{2}{5}; \$7888.30 \div 133\frac{2}{5} = \frac{788830}{1} \times \frac{16}{1337} = \$94.40; \$94.40 \times 7 = \$660.80 \text{ Ans.}$$

$$19. 132\text{£}. 12\text{s.} = 2652\text{s.}; 7\frac{1}{2} = \frac{15}{2}; 12\frac{1}{2} = \frac{25}{2}; 2652\text{s.} \div \frac{15}{2} = \frac{2652}{1} \times \frac{2}{15} = 351\text{s.}; \frac{351}{1} \times \frac{115}{9} = 4485\text{s.} = 224\text{£}. 5\text{s.} \text{ Ans.}$$

$$20. 17\frac{2}{3} = \frac{53}{3}; 89\frac{1}{3} = \frac{268}{3}; \$25.44 \div \frac{53}{3} = \frac{2544}{1} \times \frac{3}{53} =$$

$$\$144; \frac{144}{1} \times \frac{268}{3} = \$128.64 \text{ Ans.}$$

$$21. 7\frac{7}{12} = \frac{91}{12}; 19\frac{1}{12} = \frac{233}{12}; \$7.28 \div \frac{91}{12} = \frac{728}{1} \times \frac{12}{91} =$$

$$\$0.96; \$0.96 \times \frac{233}{12} = \$19.12 \text{ Ans.}$$

$$22. 49\frac{8}{9} = \frac{442}{9}; 37\frac{2}{9} = \frac{334}{9}; \$4355.52 \div \frac{442}{9} = \frac{435552}{1} \times$$

$$\frac{9}{442} = \$87.36; \frac{1248}{349} \times \frac{264}{7} = \$3294.72 \text{ Ans.}$$

$$23. \frac{1}{4} \times \frac{3}{5} = \frac{3}{20}; \$300,000 \div 3 = \$100,000; \$100,000 \times 20 =$$

$$\$2,000,000 \text{ Ans.}$$

$$24. 7\frac{6}{13} = \frac{92}{13}; 19\frac{3}{4} = \frac{79}{4}; \$135.80 \div \frac{92}{13} = \frac{13580}{1} \times \frac{13}{92} =$$

$$\$18.20; \frac{455}{1820} \times \frac{79}{4} = \$359.45 \text{ Ans.}$$

$$25. 6 \text{ cords } 76\text{ft.} = 844\text{ft.}; 7 - \frac{3}{4} = \frac{5}{4}; 4\frac{2}{5} = \frac{22}{5}; 844\text{ft.}$$

$$\times \frac{5}{4} = \frac{844}{1} \times \frac{5}{4} = \frac{3376}{1}; \frac{3376}{1} \times \frac{22}{5} = \frac{21024}{5} =$$

$$\$23.14\frac{4}{5} \text{ Ans.}$$

$$26. 30\text{rd.} \times 30\text{rd.} = 900; 18 + 82 = 100; 900 - 100 = 800;$$

$$\frac{800}{800} = \frac{8}{8} \text{ Ans.}$$

$$27. 7\text{T. } 12\text{cwt. } 3\text{qr. } 18\text{lb.} - 3\text{T. } 18\text{cwt. } 1\text{qr. } 20\text{lb.} = 3\text{T. } 14\text{cwt.}$$

$$1\text{qr. } 23\text{lb.} = 7448\text{lb.}; 7448\text{lb.} \times \frac{2}{5} = 4468\frac{4}{5}\text{lb.}; 4468\frac{4}{5}\text{lb.}$$

$$\times \$0.057 = \$242.59\frac{1}{5} \text{ Ans.}$$

$$28. \$68.50 \times 37 = \$2534.50; \$2534.50 \times \frac{3}{4} = \$1900.87\frac{1}{2}$$

$$= \text{value of coffee}; \$2534.50 - \$1900.87\frac{1}{2} =$$

$$\$633.62\frac{1}{2} \text{ Ans.}$$

$$29. \frac{1}{4} - \frac{3}{4} = \frac{1}{4}; \$7896 \times \frac{1}{4} = \$1974; \$1974 \times 2 =$$

$$\$3948 \text{ Ans.}$$

$$30. \frac{1}{3} - \frac{4}{13} = \frac{9}{13}; \frac{9}{13} \times \frac{5}{13} = \frac{45}{169}; \frac{9}{13} - \frac{45}{169} = \frac{72}{169}; \$ 88 \times \frac{72}{169} = \frac{8800}{169} \times \frac{72}{169} = \frac{633600}{169} = \$ 37.49 \frac{19}{169} \text{ Ans.}$$

$$31. \frac{1}{4} - \frac{3}{4} = \frac{1}{4}; \frac{1}{4} \times \frac{2}{3} = \frac{1}{6}; \frac{1}{4} - \frac{1}{6} = \frac{1}{12}; \frac{1}{12} \times \frac{3}{4} = \frac{1}{16} =$$

$$\$ 750; \frac{1}{16} = \$ 750 \times 16 = \$ 12,000 \text{ Ans.}$$

$$32. 1A. = 43560 \text{ ft.}; 100 \times 100 \times 20000 \text{ ft.} 43560 \text{ ft.} - 20000 \text{ ft.} 23560 \text{ ft.}; 23560 \text{ ft.} \times 8 = \$ 1884.80 \text{ Ans.}$$

## DECIMAL FRACTIONS.

### NOTATION OF DECIMAL FRACTIONS.

(ART. 181, p. 183.)		7.	75.9
1.	307.25	8.	2000.002
2.	47.7	9.	18.018
3.	18.05	10.	505.001006
4.	29.003	11.	300.0000042
5.	.0049	12.	2500.000000037
6.	8.000008	or 2500.000000000037	

### ADDITION OF DECIMALS.

#### (ART. 183, p. 184.)

(2.)	(3.)	(4.)
171.61111	.16711	151.01
16.7101	1.766	611111.01
.00007	76111.1	16.5
71.0006	167.1	6.7
1.167895	.000007	46.1
<u>260.489775</u>	<u>1476.1</u>	<u>.67896</u>
	77756.233117	611331.99896

(5.)	(6.)	(7.)
56000.014	49.0105	3.0018
19.19	89.107	1005.023043
57.0048	.000127	87.107
23005.4	.0048	.0049
.000014	138.122427	47000.00309
<u>79081.608814</u>		<u>48095.139833</u>

## SUBTRACTION OF DECIMALS.

(ART. 184, p. 185.)

(6.)	(7.)	(8.)	(9.)	(10.)
81.35	1.	100.	87.1	100.
<u>11.678956</u>	<u>.876543</u>	<u>99.111176</u>	<u>5.6789</u>	<u>.001</u>
69.671044	.123457	.888824	81.4211	99.999
(11.)	(12.)	(13.)	(14.)	(15.)
73.	365.	357000.	.875	.3125
<u>.073</u>	<u>.0047</u>	<u>28.0004009</u>	<u>.4</u>	<u>.125</u>
72.927	364.9953	356971.9995991	.475	.1875
(16.)	(17.)	(18.)	(19.)	(20.)
.95	3.7	8.125	9.375	.666
<u>.44</u>	<u>1.8</u>	<u>2.6875</u>	<u>1.5</u>	<u>.041</u>
.51	1.9	5.4375	7.875	.625

## MULTIPLICATION OF DECIMALS.

(ART. 185, p. 187.)

3.	.12649	6.	1137.
4.	18.58922	7.	2.20947
5.	.00000114	8.	.00046967
		9.	22.09
(10.)	(11.)	(12.)	(13.)
.087	107000.0015	.0097	.096
<u>.000015</u>	<u>.0107</u>	<u>400.67</u>	<u>.00096</u>
.000001305	7490000105	679	576
	<u>1070000015</u>	582	864
	1144.90001605	388	.00009216
		<u>3.886499</u>	

(14.)	(15.)	(16.)	(17.)
1000000.	100.	.101	1050.0007
<u>.000001</u>	<u>.0014</u>	<u>.10101</u>	<u>.00305</u>
1.	400	101	52500035
	100	101	31500021
	<u>.14</u>	<u>101</u>	<u>3.202502135</u>
		.01020201	

(18.)	(19.)	(20.)
2000000.	400.004	\$ 1.125
<u>.7</u>	<u>30.03</u>	<u>46.</u>
1400000.	1200012	6750
	<u>1200012</u>	<u>4500</u>
	12012.12012	\$ 51.75

(21.)	(22.)	(23.)
Tons 17.125	\$ .125	375025
<u>\$ 18.875</u>	<u>18.</u>	<u>\$ 0.62</u>
85625	1000	75050
119875	<u>125</u>	<u>225150</u>
137000	\$ 2.250	\$ 232.6550
137000		
<u>17125</u>		
\$ 823.234375		

## DIVISION OF DECIMALS.

3. (Art. 186, p. 189.)	.375	7.	.01728
4.	2.069	8.	9.784
5.	1930.51	9.	125.36
6.	.069255	10.	148.939+

(11.)	(12.)	(13.)
1.2)172.8(144.	.12)1728.00(14400.	.12).1728(1.44
(14.)	(15.)	(16.)
12)1.728(144	1.2)17.28(14.4	.0012)1728.0000(1440000.

- (17.) (18.)  
 12).001728(.000144 1000)116.81(.11631  
 (19.) (20.)  
 9.7)147.828(15.24 5.42801)75.16000(13.846+  
 (21.)  
 .328).678767(2.069+

REDUCTION OF DECIMALS.

(ART. 187, p. 190.)

- |                 |                 |                 |
|-----------------|-----------------|-----------------|
| (2.)            | (3.)            | (4.)            |
| 4)3.00          | 8)7.000         | 16)7.0000       |
| <u>.75</u>      | <u>.875</u>     | <u>.4375</u>    |
| (5.)            | (6.)            | (7.)            |
| 17)4.000000     | 11)4.000000     | 12)5.000000     |
| <u>.235294+</u> | <u>.363636+</u> | <u>.416666+</u> |
- (8.)  $.875 = \frac{875}{1000} = \frac{7}{8}$  Ans.  
 (9.)  $.4375 = \frac{4375}{10000} = \frac{7}{16}$  Ans.  
 (10.)  $.72 = \frac{72}{100} = \frac{18}{25} = \frac{2}{3}$  Ans.  
 (11.)  $.135 = \frac{135}{1000} = \frac{27}{200} = \frac{3}{25}$  Ans.  
 (12.)  $.23562 = \frac{23562}{100000} = \frac{23562}{99000}$  Ans.  
 (13.)  $.093 = \frac{93}{1000} = \frac{84}{900} = \frac{7}{75}$  Ans.

(ART. 188, p. 191.)

- |             |             |            |
|-------------|-------------|------------|
| (2.)        | (3.)        | (4.)       |
| 12   6.0    | 25   14.    | 25   21.00 |
| 20   15.5   | 4   2.56    | 4   3.84   |
| <u>.775</u> | 20   5.64   | <u>.96</u> |
|             | <u>.282</u> |            |



(5.)	(6.)
$\begin{array}{r} 40 \overline{) 8.0} \\ 8 \overline{) 6.200} \\ \hline .775 \end{array}$	$\begin{array}{r} 144 \overline{) 72.0} \\ 272 \overline{) 167.5} \\ 40 \overline{) 19.615248} \\ 4 \overline{) 3.490381} \\ \hline .872595+ \end{array}$

(ART. 189, p. 192.)

(2.)	(3.)	(4.)	(5.)
.628125	.778125	.75	.965625
<u>20</u>	<u>20</u>	<u>5</u>	<u>8</u>
12.562500	15.562500	3.75	7.725000
<u>12</u>	<u>4</u>	<u>4</u>	<u>40</u>
6.750000	* 2.250000	3.00	29.000000
<u>4</u>	<u>25</u>		
3.000000	6.250000	Ans. 8qr. 3na.	Ans. 7fur. 29rd.
<u>Ans. 12s. 6<math>\frac{1}{2}</math>d.</u>	<u>16</u>		
	4.000000		

Ans. 15cwt. 2qr. 6lb. 4oz.

(6.)	(7.)	(8.)
.94375	.185625	.5555
<u>4</u>	<u>12</u>	<u>12</u>
3.77500	9.787500	6.6660
<u>40</u>	<u>20</u>	<u>8</u>
31.00000	15.750000	5.3280
<u>Ans. 3R. 31p.</u>	<u>24</u>	<u>3</u>
	18.000000	.9840
	Ans. 9oz. 15pwt. 18gr.	<u>20</u>
		19.6800
		Ans. 6 $\frac{3}{4}$ 5 $\frac{3}{4}$ 0 $\frac{1}{2}$ 19 $\frac{1}{4}$ gr.

EXERCISES IN DECIMALS.

$$\begin{array}{r}
 (1.) \\
 25 \overline{) 14.} \\
 4 \overline{) 3.56} \\
 \underline{15.89} \\
 9.50 \\
 \underline{79450} \\
 14301 \\
 \hline
 \$ 150.95,50
 \end{array}$$

$$\begin{array}{r}
 (2.) \\
 25 \overline{) 7.} \\
 4 \overline{) 1.28} \\
 20 \overline{) 18.32} \\
 \underline{17.916} \\
 53.80 \\
 \underline{1433280} \\
 53748 \\
 89580 \\
 \hline
 \$ 963.88,080
 \end{array}$$

3.  $16 \div 40 = .4$ ;  $3 + .4 = 3.4$ ;  $3.4 \div 4 = .85$ ;  $37 + .85 = 37.85$ ;  
 $37.85 \times \$ 75.16 = \$ 2844.806$  Ans.
4.  $2 \div 4 = .5$ ;  $3 + .5 = 3.5$ ;  $3.5 \div 4 = .875$ ;  $15 + .875 = 15.875$ ;  
 $15.875 \times \$ 3.75 = \$ 59.53,125$  Ans.
5.  $15.375 \times \$ 4.62,5 = \$ 71.10,9375$  Ans.
6.  $36 \div 40 = .9$ ;  $6 + .9 = 6.9$ ;  $6.9 \div 8 = .8625$ ;  $17 + .8625 =$   
 $17.8625$ ;  $17.8625 \times \$ 3765.60 = \$ 67263.03$  Ans.
7.  $21 \div 63 = .333 +$ ;  $27 + .333 + = 27.333 +$ ;  $27.333 + \times$   
 $\$ 15.375 = \$ 420.24,4875 +$  Ans.
8.  $9 \div 12 = .75$ ;  $18 + .75 = 18.75$ ;  $6 \div 12 = .5$ ;  $4 + .5 = 4.5$ ;  
 $3 \div 12 = .25$ ;  $7 + .25 = 7.25$ ;  $18.75 \times 4.5 \times 7.25 =$   
 $611.71875\text{ft.}$ ;  $.71875 \times 1728 = 1242\text{in.}$  Ans.  $611\text{ft.}$   
 $1242\text{in.}$
9.  $6 \div 12 = .5$ ;  $12 + .5 = 12.5$ ;  $9 \div 12 = .75$ ;  $2 + .75 = 2.75$ ;  
 $12.5 \times 2.75 = 34.375\text{ft.}$ ;  $.375 \times 144 = 54\text{in.}$  Ans.  $34\text{ft.}$   
 $54\text{in.}$
10.  $1 \div 2 = .5$ ;  $3 + .5 = 3.5$ ;  $3.5 \div 4 = .875$ ;  $25 + .875 = 25.875$ ;  
 $25.875 \times \$ .375 = \$ 9.70,3125$  Ans.
11.  $30 \div 40 = .75$ ;  $3 + .75 = 3.75$ ;  $3.75 \div 4 = .9375$ ;  $144 +$   
 $.9375 = 144.9375$ ;  $144.9375 \times \$ 97.625 = \$ 14149.52,-$   
 $34375$  Ans.
12.  $21 \div 25 = .84$ ;  $.84 \div 4 = .21$ ;  $18 + .21 = 18.21$ ;  $18.21 \div 20$   
 $= .9105$ ;  $3 + .9105 = 3.9105$ ;  $3.9105 \times \$ 9.375 =$   
 $\$ 36.6609375$ ;  $\$ 36.6609375 - \$ 20.25 = \$ 16.41,09$   
 $375$  Ans.

13.  $\$ 5.50 \div 7 = \$.78\frac{1}{2}$ ;  $\$.78\frac{1}{2} \times 8 = \$ 6.28\frac{1}{2}$ ;  $\$ 6.28\frac{1}{2} \times 7.75 = \$ 48.71,42\frac{1}{2}$  Ans.
14.  $\$ 12\frac{1}{2} = \$ 12.625$ ;  $4\frac{1}{2} = 4.75$ ;  $\$ 12.625 \div 4.75 = 2.657894+$ ;  $2.657894+ \times 17.375 = \$ 46.18,09+$  Ans.
15.  $\frac{1}{2} - \frac{1}{4} = \frac{1}{4}$ ;  $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$ ;  $\frac{1}{8} + \frac{1}{4} = \frac{3}{8}$ ;  $\frac{3}{8} \times \$ 17500 = \$ 87500$ ;  $\$ 87500 + \$ 500 = \$ 18000$ ;  $\$ 9000 + \$ 9200 + \$ 18000 = \$ 36200$ ;  $\$ 36200 - \$ 18000 = \$ 1200$  Ans.

## PERCENTAGE.

- |                        |              |    |              |
|------------------------|--------------|----|--------------|
| 2. (Art. 191, p. 195.) | $\$ 6.50$    | 6. | $\$ 490$     |
| 3.                     | $\$ 39.45$   | 7. | $\$ 15.12$   |
| 4.                     | $\$ 51.38,9$ | 8. | 26.415 yards |
| 5.                     | 57.375 tons. | 9. | $\$ 877.50$  |
10.  $5000 \times \$ 1.25 = \$ 6250$ ;  $\$ 5000 \times .25 = 1250$ ;  $5000 - 1250 = 3750$ ;  $3750 \times \$ 2 = \$ 7500$ ;  $\$ 7500 - \$ 6250 = \$ 1250$  Ans.
11.  $\$ 8000 \times .19 = \$ 1520$ ;  $\$ 8000 - \$ 1520 = \$ 6480$ ;  $\$ 6480 \times .37 = \$ 2397.60$ ;  $\$ 6480.00 - \$ 2397.60 = \$ 4082.40$ ;  $\$ 4082.40 - \$ 2000 = \$ 2082.40$  Ans.

(12.)

- |  |  |
|--|--|
| $1\frac{1}{2} = 1.75$                              | 12635)80000(6yd.<br>75810<br>4190<br>4               |
| $1.75 \times .95 = 1.6625$                         |  |
| $10 \div 1.6625 = 6\frac{2}{133} = 6\frac{2}{133}$ | 12635)16760(1qr.<br>12635<br>4125<br>4               |
| $6\frac{2}{133} \times 100 = 6\frac{200}{133}$     | 12635)16500( $1\frac{773}{527}$ na.<br>12635<br>3865 |
| Ans. 6yd. 1qr. $1\frac{773}{527}$ na.              |  |
13.  $\$ 10,000 \times .15 = \$ 1500$ ;  $\$ 10,000 - \$ 1500 = \$ 8500$  Ans.

## SIMPLE INTEREST.

(ART. 193, p. 198.)		6..	\$ 0.42,2 $\frac{1}{2}$
2.	\$ 0.08,1	7.	\$ 0.01,9 $\frac{1}{2}$
3.	\$ 0.10,7	8.	\$ 0.25,0 $\frac{1}{2}$
4.	\$ 0.22,3 $\frac{1}{2}$	9.	\$ 0.02,0 $\frac{1}{2}$
5.	\$ 0.12,8 $\frac{1}{2}$		
(ART. 194, p. 199.)		11.	\$ 88.39,9
2.	\$ 11.82	12.	\$ 122.71,5
3.	\$ 311.04	13.	\$ 1.24,8
4.	\$ 8.28	14.	\$ 0.20,5
5.	\$ 155.52	15.	\$ 50.01,6
6.	\$ 1.68,7	16.	\$ 0.03,1
7.	\$ 17.72,2	17.	\$ 55.60,7
8.	\$ 8.25,8	18.	\$ 149.77,6
9.	\$ 90.83,5	19.	\$ 7.20,5
10.	\$ 1110.23,4	20.	\$ 1.05,7
(ART. 195 p. 201.)		9.	\$ 14.15,1
1.	\$ 10.08	10.	\$ 33.97,9
2.	\$ 97.18	11.	\$ 1645.02
3.	\$ 231.29,9	12.	\$ 13.91
4.	\$ 78.41,4	13.	\$ 209.82
5.	\$ 446.92,9	14.	\$ 1183.18
6.	\$ 0.84,9	15.	\$ 21.03,7
7.	\$ 430.36	16.	\$ 388.94
8.	\$ 137.92,2		
(ART. 196, p. 202.)		7.	\$ 2163.19,9
2.	\$ 745.50	8.	\$ 274.77,5
3.	\$ 207.27	9.	\$ 131.99
4.	\$ 19.71,3	10.	\$ 253.11,9
5.	\$ 61.75,4	11.	\$ 95.02,8
6.	\$ 1.86,8	12.	\$ 1904.12,1

(2.) (ART. 197, p. 203.)

26£. 10s. = 26.50£.	
Interest of 1£. = .14	(Brought up.)
<u>10600</u>	3.0916 $\frac{1}{2}$
2650	<u>20</u>
6)3.7100	1.8333 $\frac{1}{2}$
6183 $\frac{1}{2}$	<u>12</u>
3.0916 $\frac{1}{2}$	10.0000
(Carried up.)	3£. 1s. 10d. Ans.

(3.)

42£. 18s. = 42.90£.
Interest of 1£. = .109 $\frac{1}{2}$
<u>38610</u>
4290
<u>715</u>
4.68325
<u>20</u>
13.66500
<u>12</u>
7.98
<u>4</u>
3.92

4£. 13s. 7 $\frac{1}{2}$ d. Ans.

(4.)

94£. 12s. 6d. = 94.625£.
Interest of 1£. = .271 $\frac{1}{8}$
<u>94625</u>
662375
<u>189250</u>
15770
$\frac{3}{8} = \frac{1}{2}$ 25.659145
8.553048
<u>34.212193</u>
<u>20</u>
4.243860
<u>12</u>
2.92632
<u>4</u>
3.70528

34£. 4s. 2 $\frac{3}{4}$ d. Ans.

## MISCELLANEOUS EXERCISES IN INTEREST.

(PAGE 204.)

NOTE. — When the required interest is more or less than 6 per cent., we may first find the interest at 6 per cent. by the foregoing Rules, then divide this interest by 6, and the quotient will be the interest of the required sum at 1 per cent. Then, if we multiply the 1 per cent. by the required per cent., we obtain the answer. Or the pupil, if he please, can perform the following questions by Article 200.

(1.)

y.	mo.	d.
1852	6	9
1850	8	25
<hr/>		
1	9	14
<hr/>		
\$	172.50	
<hr/>		
	.107½	
<hr/>		
	120750	
<hr/>		
	17250	
<hr/>		
	5750	
<hr/>		
\$	18.51,500	

(4.)

y.	mo.	d.
1851	11	11
1849	3	7
<hr/>		
2	8	4
<hr/>		
\$	67.07	
<hr/>		
	.160½	
<hr/>		
	402420	
<hr/>		
	6707	
<hr/>		
	4471	
<hr/>		
\$	10.77,591	

(7.)

y.	mo.	d.
1852	1	11
1851	2	1
<hr/>		
	11	10
<hr/>		
\$	7.18	
<hr/>		
	.056½	
<hr/>		
	4308	
<hr/>		
	3590	
<hr/>		
	478	
<hr/>		
\$	.40,686	

(2.)

y.	mo.	d.
1851	4	5
1848	11	10
<hr/>		
2	4	25
<hr/>		
\$	169.75	
<hr/>		
	.144½	
<hr/>		
	67900	
<hr/>		
	67900	
<hr/>		
	16975	
<hr/>		
	2829	
<hr/>		
\$	24.47,229	

(5.)

y.	mo.	d.
1851	11	19
1849	0	7
<hr/>		
2	11	12
<hr/>		
\$	117.75	
<hr/>		
	.177	
<hr/>		
	82425	
<hr/>		
	82425	
<hr/>		
	11775	
<hr/>		
\$	20.84,175	

(8.)

y.	mo.	d.
1855	10	25
1852	4	29
<hr/>		
3	5	26
<hr/>		
\$	976.18	
<hr/>		
	.209½	
<hr/>		
	878562	
<hr/>		
	195236	
<hr/>		
	32589	
<hr/>		
\$	204.84,701	

(3.)

y.	mo.	d.
1851	8	1
1847	6	29
<hr/>		
4	1	2
<hr/>		
\$	17.18	
<hr/>		
	.245½	
<hr/>		
	8590	
<hr/>		
	6872	
<hr/>		
	3436	
<hr/>		
	572	
<hr/>		
\$	4.21,482	

(6.)

y.	mo.	d.
1853	0	11
1849	9	9
<hr/>		
3	3	2
<hr/>		
\$	847.15	
<hr/>		
	.195½	
<hr/>		
	423575	
<hr/>		
	762435	
<hr/>		
	84715	
<hr/>		
	28238	
<hr/>		
\$	165.47,663	

(9.)

y.	mo.	d.
1852	2	9
1849	6	25
<hr/>		
2	7	14
<hr/>		
\$	144	
<hr/>		
	.157½	
<hr/>		
	1008	
<hr/>		
	720	
<hr/>		
	14448	
<hr/>		
	22.656	
<hr/>		
	144.	
<hr/>		
\$	166.65,6	

## KEY TO

(10.)

y.	mo.	d.
1852	0	1
1850	0	19
<hr/>		
1	11	12
<hr/>		
\$ 375.83		
<hr/>		
.117		
<hr/>		
263081		
<hr/>		
37583		
<hr/>		
37583		
<hr/>		
43.97,211		
<hr/>		
375.83		
<hr/>		
419.80,211		
<hr/>		
79.33,918		
<hr/>		
\$ 499.14,129		

(12.)

y.	mo.	d.
1852	11	30
1849	1	17
<hr/>		
3	10	13
<hr/>		
\$ 79.15		
<hr/>		
.232 $\frac{1}{6}$		
<hr/>		
15830		
<hr/>		
23745		
<hr/>		
15830		
<hr/>		
1319		
<hr/>		
6)18.37,599		
<hr/>		
3.06,266		
<hr/>		
7 $\frac{1}{2}$		
<hr/>		
21.43,862		
<hr/>		
1.53,133		
<hr/>		
22.96,995		
<hr/>		
79.15		
<hr/>		
\$ 102.11,995		

(11.)

y.	mo.	d.
1852	0	1
1851	3	23
<hr/>		
8	8	
<hr/>		
\$ 76.19		
<hr/>		
.041 $\frac{1}{2}$		
<hr/>		
7619		
<hr/>		
30476		
<hr/>		
2539		
<hr/>		
3.14,918		
<hr/>		
76.19		
<hr/>		
\$ 79.33,918		

(18.)

y.	mo.	d.
1851	11	9
1850	5	19
<hr/>		
1	5	20
<hr/>		
\$ 89.96		
<hr/>		
.088 $\frac{1}{2}$		
<hr/>		
71968		
<hr/>		
71968		
<hr/>		
2998		
<hr/>		
6)7.94,646		
<hr/>		
1.32,441		
<hr/>		
8 $\frac{1}{2}$		
<hr/>		
10.59,528		
<hr/>		
.33,110		
<hr/>		
10.92,638		
<hr/>		
89.96		
<hr/>		
\$ 100.88,638		

(11.)

y.	mo.	d.
1851	5	11
1850	5	5
<hr/>		
1	0	6
<hr/>		
\$ 68.19		
<hr/>		
.061		
<hr/>		
6819		
<hr/>		
40914		
<hr/>		
6)4.15,959		
<hr/>		
.69,326		
<hr/>		
\$ 4.85,285		

(14.)

y.	mo.	d.
1851	6	4
1849	5	5
<hr/>		
2	0	29
<hr/>		
\$ 325.00		
<hr/>		
.124 $\frac{3}{8}$		
<hr/>		
130000		
<hr/>		
65000		
<hr/>		
32500		
<hr/>		
27000		
<hr/>		
6)40.57,000		
<hr/>		
6.76,166		
<hr/>		
7 $\frac{1}{2}$		
<hr/>		
47.33,162		
<hr/>		
1.69,041		
<hr/>		
49.02,203		
<hr/>		
325.		
<hr/>		
\$ 374.02,203		

(15.)

y.	mo.	d.
1852	9	9
1849	11	29
<hr/>		
2	9	10

\$ 1728

.166 $\frac{1}{2}$ 

10368

10368

1728

1152

6)288.000

48.000

9

432.000

1728.

\$ 2160.000

(17.)

y.	mo.	d.
1853	8	25
1851	4	7
<hr/>		
2	4	18

\$ 175.08

.143

52524

70032

17508

6)25.03,644

4.17,274

29.20,918

175.08\$ 204.28,9

(16.)

y.	mo.	d.
1852	6	4
1851	0	29
<hr/>		
1	5	5

\$ 976.18

.085 $\frac{1}{2}$ 

488090

780944

81348

83.78,878

2

\$ 167.57,756

(18.)

y.	mo.	d.
1854	8	9
1853	11	11
<hr/>		
8	28	

\$ 160

.044 $\frac{1}{2}$ 

640

640

106

6)7.14,6

1.19,1

8.33,7

160.\$ 168.33,7



## PARTIAL PAYMENTS.

(ART. 198, p. 205.)

(2.)

Principal, . . . . . \$ 987.75  
 Interest for 9 months, 2 days, . . . . . 44.77

Amount, \$ 1032.52

First payment, . . . . . \$ 800.00

Interest for 7 months, 12 days, . . . . . 11.10

Second payment, . . . . . 400.00

Interest for 6 months, 8 days, . . . . . 12.53

Third payment, . . . . . 150.00

Interest for 2 months, 18 days, . . . . . 1.95

\$ 875.58

Balance remains due Dec. 13, 1852, . . . . . \$ 156.94

y.	mo.	d.	y.	mo.	d.	y.	mo.	d.	y.	mo.	d.
1852	11	13	1852	11	13	1852	11	13	1852	11	13
1852	0	11	1852	4	1	1852	5	5	1852	8	25

11 27 126 82 18

2 0

9 2

\$ 987.75

\$ 800

\$ 400

\$ 150

.045½

.037

.031½

.018

498875

2100

400

450

395100

900

1200

150

32925

\$ 11.10,0

133

\$ 1.95,0

\$ 44.77,800

\$ 12.53,3

(3.)

Principal, . . . . . \$ 800.00

Interest for 10 months, 27 days, . . . . . 43.60

Amount, \$ 843.60

First payment, . . . . . \$ 144.00

Interest for 9 months, 21 days, . . . . . 6.98

Second payment, . . . . . 90.00

Interest for 7 months, . . . . . 3.15

Amounts carried forward, \$ 244.13 \$ 843.60

Amounts brought forward, \$ 244.13		\$ 843.60
Third payment,	400.00	
Interest for 5 months,	10.00	
Fourth payment,	100.00	
Interest for 2 months, 27 days,	1.45	
		<u>\$ 755.58</u>

Remains due June 1, 1853, \$ 88.02

y.	mo.	d.	y.	mo.	d.	y.	mo.	d.
1853	5	1	1853	5	1	1853	5	1
1852	6	4	1852	7	10	1852	10	1
<u>10 27</u>			<u>9 21</u>			<u>7 0</u>		
\$ 800			\$ 144			\$ 90		
<u>.054<math>\frac{1}{2}</math></u>			<u>.048<math>\frac{1}{2}</math></u>			<u>.035</u>		
3200			1152			450		
4000			576			270		
400			72			<u>\$ 3.15,0</u>		
<u>\$ 43.60,0</u>			<u>\$ 6.98,4</u>					

y.	mo.	d.
1853	5	1
1853	0	1
<u>5 0</u>		
\$ 400		
<u>.025</u>		
2000		
800		
<u>\$ 10.00,0</u>		

y.	mo.	da.
1853	5	1
1853	2	4
<u>2 27</u>		
\$ 100		
<u>.014<math>\frac{1}{2}</math></u>		
400		
100		
50		
<u>\$ 1.45,0</u>		

(ART. 200, p. 208.)

(2.)

Principal, carrying interest from June 5, 1848,	\$ 1666.00
Interest from June 5, 1848, to January 1, 1851, 30	
months, 26 days,	<u>257.11</u>
Amount carried forward,	\$ 1923.11

Amount brought forward, \$ 1923.11		
First payment, July 4, 1849, a sum less		
than the interest, . . . . .	\$ 100.00	
Second payment, Jan. 1, 1850, a sum less		
than the interest, . . . . .	10.00	
Third payment, July 4, 1850, a sum less		
than the interest, . . . . .	15.00	
Fourth payment, Jan. 1, 1851, a sum larger		
than the interest, . . . . .	<u>500.00</u>	
		625.00
		<u>1298.11</u>
Interest from Jan. 1, 1851, to Feb. 7, 1852, 13		
months, 6 days, . . . . .		85.67
	Amount,	<u>1388.78</u>
Fifth payment, Feb. 7, 1852, . . . . .		656.00
		<u>727.78</u>
Interest from Feb. 7, 1852, to Jan. 1, 1853, 10		
months, 24 days, . . . . .		39.30
Remains due Jan. 1, 1853, . . . . .		<u>\$ 767.08</u>
(3.)		
Principal on interest from Oct. 23, 1850, . . . . .	\$ 960.00	
Interest from Oct. 23, 1850, to Sept. 25, 1851, 11		
months, 2 days, . . . . .		61.97
	Amount,	<u>1021.97</u>
First payment, Sept. 25, 1851, . . . . .		140.00
New principal, carrying interest from Sept. 25, 1851,		<u>881.97</u>
Interest from Sept. 25, 1851, to July 7, 1852, 9		
months, 12 days, . . . . .		48.36
	Amount,	<u>930.33</u>
Second payment, July 7, 1852, . . . . .		80.00
New principal, carrying interest from July 7, 1852,		<u>850.33</u>
Interest from July 7, 1852, to Dec. 9, 1852, 5 months,		
2 days, . . . . .		25.13
	Amount carried forward,	<u>\$ 875.46</u>

Amount brought forward,	\$ 875.46
Third payment, Dec. 9, 1852,	<u>70.00</u>
New principal, carrying interest from Dec. 9, 1852,	805.46
Interest from Dec. 9, 1852, to Nov. 8, 1853, 10 months,	
29 days,	<u>51.52</u>
Amount,	856.98
Fourth payment, Nov. 8, 1852,	<u>100.00</u>
New principal, carrying interest from Nov. 8, 1853,	756.98
Interest from Nov. 8, 1853, to Oct. 23, 1854, 11 months,	
15 days,	<u>50.78</u>
Balance due Oct. 23, 1854,	\$ 807.76

(4.)

Principal on interest from March 1, 1849,	\$ 1000.00
Interest from March 1, 1849, to March 1, 1850, 12 months,	<u>70.00</u>
Amount,	1070.00
First payment, March 1, 1850,	<u>100.00</u>
Principal, carrying interest from March 1, 1850,	970.00
Interest from March 1, 1850, to Sept. 25, 1851, 18 months, 24 days,	<u>106.37</u>
Amount,	1076.37
Second payment, Sept. 25, 1851,	<u>200.00</u>
Principal, carrying interest from Sept. 25, 1851,	876.37
Interest from Sept. 25, 1851, to Oct. 9, 1852, 12 months, 14 days,	<u>63.73</u>
Amount	940.10
Third payment, Oct. 9, 1852,	<u>150.00</u>
Principal, carrying interest from Oct. 9, 1852,	790.10
Interest from Oct. 9, 1852, to Oct. 9, 1853, 12 months,	<u>55.80</u>
Amount carried forward,	\$ 845.40

Amount brought forward,	\$ 845.40
Fourth payment, July 4, 1853, a sum less than the interest, . . . . .	\$ 20.00
Fifth payment, Oct. 9, 1853, a sum greater than the interest, . . . . .	<u>300.00</u>
	320.00
Principal, carrying interest from Oct. 9, 1853, . .	525.40
Interest from Oct. 9, 1853, to Dec. 1, 1854, 13 months, 22 days, . . . . .	<u>42.09</u>
Balance due Dec. 1, 1854, . . . . .	\$ 567.49

(ART. 201, p. 209.)

(1.)

Principal, . . . . .	\$ 500.00
Interest from July 1, 1854, to Sept. 1, 1855, 14 months,	<u>35.00</u>
Amount,	535.00
First payment, Sept. 1, 1855, . . . . .	<u>100.00</u>
Balance for new principal, . . . . .	435.00
Interest from Sept. 1, 1855, to Sept. 1, 1856, 1 year,	<u>26.10</u>
Amount,	461.10
Amount of 2d payment, from April 1, 1856, to Sept. 1, 1856, 5 months, . . . . .	<u>147.60</u>
Balance for new principal, . . . . .	313.50
Interest from Sept. 1, 1856, to Sept. 1, 1857, 1 year,	<u>18.81</u>
Amount,	332.31
Amount of 3d payment, from Jan. 1, 1857, to Sept. 1, 1857, 8 months, . . . . .	<u>94.12</u>
Balance for new principal, . . . . .	238.19
Interest from Sept. 1, 1857, to Dec. 1, 1858, 15 months,	<u>17.86</u>
Amount,	256.05
Fourth payment, . . . . .	<u>168.05</u>
Balance for new principal, . . . . .	88.00
Interest from Dec. 1, 1858, to Oct. 1, 1859, 10 months,	<u>4.40</u>
Amount due Oct. 1, 1859, . . . . .	\$ 92.40

## PROBLEMS IN INTEREST.

2. (ART. 204, p. 211.)  $\$250 \times .0125 = \$3.125$ ;  $\$28.125 \div 3.125 = 9$  per cent. Ans.
3.  $\$72 \times .0175 = \$1.26$ ;  $\$8.82 \div 1.26 = 7$  per cent. Ans.
4.  $\$500 \times .025 = \$12.50$ ;  $\$550 - \$500 = \$50$ ;  $50 \div 12.50 = 4$  per cent. Ans.
5.  $\$700 \times .015 = \$10.50$ ;  $\$63.00 \div \$10.50 = 6$  per cent. Ans.
6.  $\$922 \times .01\frac{1}{2} = \$10.75\frac{1}{2}$ ;  $\$53.78\frac{1}{2} \div \$10.75\frac{1}{2} = 5$  per cent. Ans.
2. (ART. 205.)  $\$140 \times .06 = \$8.40$ ;  $\$42.00 \div 8.40 = 5$  years, Ans.
3.  $\$165 \times .06 = \$9.90$ ;  $\$14.85 \div 9.90 = 1$  year, 6 months, Ans.
4.  $\$98 \times .08 = \$7.84$ ;  $\$25.48 \div 7.84 = 3$  years, 3 months, Ans.
5.  $\$727.60 - \$680 = \$47.60$ ;  $\$680 \times .04 = \$27.20$ ;  $\$47.60 \div 27.20 = 1$  year, 9 months, Ans.
2. (ART. 206, p. 212.)  $\$1.00 \times .255 = \$0.255$ ;  $\$24.225 \div .255 = \$95$  Ans.
3.  $\$1.00 \times .28 = \$0.28$ ;  $\$5.11 \div .28 = \$18.25$  Ans.
4.  $\$1.00 \times .15 = \$0.15$ ;  $\$42 \div .15 = \$280$  Ans.

## COMPOUND INTEREST.

2. (ART. 208, p. 214.)  $1.06 \times 1.06 \times 1.06 \times 1.06 \times \$761.75 = \$961.69,1$ ;  $\$961.69,1 - \$761.75 = \$199.94,1$  Ans.
3.  $1.06 \times 1.06 \times 1.06 \times \$67.25 = \$80.09,5$  Ans.
4.  $1.07 \times 1.07 \times 1.07 \times 1.07 \times 1.07 \times \$78.69 = \$110.36,4$  Ans.
5.  $1.06 \times 1.06 \times 1.06 \times 1.028 \times \$128 = \$156.71,7$  Ans.
6.  $1.06 \times 1.06 \times 1.041\frac{1}{2} \times \$76.18 = \$89.14,7$ ;  $\$89.14,7 - \$76.18 = \$12.96,7$  Ans.

2. (ART. 209, p. 215.) \$ 1.315931, amount of \$ 1 for 7 years at 4 per cent. ;  $\$ 884 \times 1.315931 = \$ 1163.28,3$ ;  $\$ 1163.28,3 - \$ 884 = \$ 279.28,3$  Ans.
3. \$ 1.551328, amount of \$ 1 for 9 years at 5 per cent. ;  $\$ 721 \times 1.551328 = \$ 1118.50,7$ ;  $\$ 1118.50,7 - \$ 721 = \$ 397.50,7$  Ans.
4. \$ 1.425760, amount of \$ 1 for 12 years at 3 per cent. ;  $\$ 960 \times 1.425760 = \$ 1368.72,96$ ; \$ 1.015, amount of \$ 1 for 6 months at 3 per cent. ;  $\$ 1368.72,96 \times 1.015 = \$ 1389.26$  Ans.
5. \$ 3.869685, amount of \$ 1 for 20 years at 7 per cent. ;  $\$ 25.50 \times 3.869685 = \$ 98.67,696$ ; \$ 1.014, amount of \$ 1 for 2 months and 12 days at 7 per cent. ;  $\$ 98.67,696 \times 1.014 = \$ 100.05,8$  Ans.
6.  $\$ 12 \times 1.005 \times 1.005 \times 1.005 \times 1.005 \times 1.005 \times 1.005 = \$ 12.86,4+$  Ans.
7.  $\$ 100 \times 1.000\frac{1}{2} \times 1.000\frac{1}{2} \times 1.000\frac{1}{2} \times 1.000\frac{1}{2} \times 1.000\frac{1}{2} \times 1.000\frac{1}{2} = \$ 100.10,004$  Ans.

## DISCOUNT.

2. (ART. 213, p. 217.) \$ 1.06, amount of \$ 1 for 1 year;  $\$ 152.64 \div 1.06 = \$ 144$  Ans.
3. \$ 1.24 amount of \$ 1 for 4 years;  $\$ 477.71 \div 1.24 = \$ 385.25$  Ans.
4. \$ 1.20 amount of \$ 1 for 3 years, 4 months;  $\$ 172.86 \div 1.20 = \$ 144.05$ ;  $\$ 172.86 - \$ 144.05 = \$ 28.81$  Ans.
5. \$ 1.218 amount of \$ 1 for 3 years, 7 months, 18 days;  $\$ 800 \div 1.218 = \$ 656.814+$ ;  $\$ 800 - \$ 656.814 = \$ 143.18,6$  Ans.

	y.	mo.	d.	
6.	1854	0	1	\$ 1.0745, amount of \$1.00 for 1 year, 2
	1852	9	4	months, 27 days; $\$ 875.75 \div 1.0745$
		1	2	$= \$ 349.69,7$ Ans.

y.	mo.	d.	
7. 1853	3	5	\$ 1.015 $\frac{1}{2}$ , amount of \$ 1.00 for 3 months, 4
1853	0	1	days; \$ 125.75 $\div$ 1.015 $\frac{1}{2}$ = \$ 123.81 +
	3	4	Ans.

COMMISSION, BROKERAGE, AND STOCKS.

(ART. 215, p. 219.)

(2.)	(3.)	(4.)	(5.)
\$ 5678	\$ 7896	\$ 1728	\$ 15.50
.03	.02	.01 $\frac{1}{2}$	97
<u>\$ 170.34</u>	<u>\$ 157.92</u>	1728	10850
		864	13950
		<u>\$ 25.92</u>	1503.50
			.02 $\frac{1}{2}$
			30.07,00
			7.51,75
			<u>\$37.58,75</u>

(6.)	(7.)	(8.)
\$ 6.50	\$ 2.75	\$ 2500
500	88	.00 $\frac{1}{2}$
<u>3250.00</u>	<u>2200</u>	<u>\$ 12.50</u>
242.00	2200	
593.60	<u>\$ 242.00</u>	
4085.60	\$ 10.60	
.03 $\frac{1}{2}$	56	
<u>1225680</u>	<u>6360</u>	
306420	530	
<u>\$ 153.21,00</u>	<u>\$ 593.60</u>	

2. (ART. 216, p. 220.) \$ 2000  $\div$  1.01,5 = \$ 1970.44,3, sum invested; \$ 2000 - \$ 1970.44,3 = \$ 29.55,7, commission,  
Ans.

3. \$ 5256  $\div$  1.03 = \$ 5102.91,2; \$ 5256 - \$ 5102.91,2 =  
\$ 153.08,8 Ans.



$$4. \$ 3865.94 \div 1.04 = \$ 3717.25, \text{ sum expended ; } \$ 3865.94 - \$ 3717.25 = \$ 148.69, \text{ commission, Ans.}$$

$$5. \$ 10000 \div 1.03,25 = \$ 9685.23+, \text{ value of flour ; } \$ 10000 - \$ 9685.23+ = \$ 314.76+, \text{ commission, Ans.}$$

(ART. 217, p. 220.)

$$2. \$ 100 \times 10 = \$ 1000 ; \$ 1000 \times .15 = \$ 150 ; \$ 1000 + \$ 150 = \$ 1150 \text{ Ans.}$$

$$3. \$ 100 \times 75 = \$ 7500 ; \$ 7500 \times .25 = \$ 1875 ; 7500 + \$ 1875 = \$ 9375.$$

$$4. \$ 8979 \times .12 = \$ 1077.48 ; \$ 8979 + \$ 1077.48 = \$ 10056.48 \text{ Ans.}$$

$$5. \$ 1789 \times .09 = \$ 161.01 ; \$ 1789 - \$ 161.01 = \$ 1627.99 \text{ Ans.}$$

$$6. \$ 100 \times 5 = \$ 500 ; \$ 500 \times .12 = \$ 60 \text{ Ans.}$$

$$7. \$ 100 \times 20 = \$ 2000 \times .12\frac{1}{2} = \$ 250 ; \$ 2000 - \$ 250 = \$ 1750 \text{ Ans.}$$

$$8. \$ 100 \times 15 = \$ 1500 \times .08\frac{1}{4} = \$ 123.75 ; \$ 1500 + \$ 123.75 = \$ 1623.75 \text{ Ans.}$$

$$9. \$ 175 \times 87 = \$ 15225, 15225 \times 31\frac{1}{2} = \$ 4795.875 \text{ Ans.}$$

## BANK DISCOUNT.

(ART. 220, p. 223.)

(2.)	(3.)	(4.)	(5.)
\$ 478	\$ 780	\$ 1728	\$ 1000
<u>.010<math>\frac{1}{2}</math></u>	<u>.005<math>\frac{1}{2}</math></u>	<u>.15<math>\frac{1}{2}</math></u>	<u>.20<math>\frac{1}{2}</math></u>
4780	3900	8640	20000
239	390	1728	500
<u>\$ 5.01,9</u>	<u>\$ 4.29,0</u>	864	<u>\$ 20.50,0</u>
		<u>\$ 26.78,4</u>	

$$\begin{array}{r}
 \$ 1000 \\
 20.50 \\
 \hline
 \text{Ans. } \$ 979.50
 \end{array}$$

(6.)	(7.)	(8.)
\$ 875.35	\$ 596.24	\$ 1350.50
.038	.042	.080 $\frac{1}{2}$
<u>700280</u>	<u>119248</u>	<u>10804000</u>
262605	238496	67525
6)33.26,330	25.04,208	108.71,525
5.54,386	8	5
<u>\$ 38.80,716</u>	6)200.33,664	6)543.57,625
\$ 875.35,0	\$ 33.38,944	Ans. \$ 90.59,604
38.80,7	\$ 596.24,0	
\$ 836.54,2 Ans.	33.38,9	
	\$ 562.85,1 Ans.	

(ART. 221, p. 224.)

2. \$ 1.0000 — .0205 = .9795 ; \$ 300 ÷ .9795 = \$ 306.27,8  
Ans.
3. \$ 1.0000 — .0305 = .9695 ; \$ 4572.40 ÷ .9695 = \$ 4716.-  
24,5 Ans.
4. \$ 1.0000 — .0255 = .9745 ; \$ 1000 ÷ .9745 = \$ 1026.-  
16,7 Ans.
5. \$ 1.000000 — .050625 = .949375 ; \$ 483.56 ÷ .949375 =  
\$ 509.34,5 Ans.

## INSURANCE.

(ART. 223, p. 225.)

(2.)	(3.)	(4.)
\$ 868	\$ 1728	\$ 3500
.12	.15	.01 $\frac{1}{2}$
<u>\$ 104.16</u>	<u>8640</u>	<u>3500</u>
	1728	2625
	\$ 259.20	\$ 61.25

(5.)	(6.)
\$ 35000	\$ 75000
<u>.08<math>\frac{3}{4}</math></u>	<u>.02<math>\frac{1}{2}</math></u>
105000	150000
26250	37500
<u>\$ 1312.50</u>	\$ 1875.00 premium.
\$ 35000.00	\$ 75000
1312.50	1875
<u>Ans. \$ 33687.50</u>	<u>\$ 73125 loss.</u>

### CUSTOM-HOUSE BUSINESS.

2. (ART. 225, p. 226.)  $\$ 3200 \times .20 = \$ 640$  Ans.
3.  $2231 \times .04 = \$ 89.24$ ;  $\$ 89.24 \times .30 = \$ 26.77, 2$ , duty,  
Ans.
4.  $1691 \times .05 = \$ 84.55$ ;  $\$ 84.55 \times .20 = \$ 16.91$ , duty, Ans.
5.  $150 \times 10 = 1500$ ;  $1500 - 50 = 1450$ ;  $1450 \times .25 =$   
 $\$ 362.50$ ;  $\$ 362.50 \times .20 = \$ 72.50$  Ans.
6.  $450 \times .15 = 67\frac{1}{2}$  lb.;  $450 - 67\frac{1}{2} = 382\frac{1}{2}$  lb.;  $382\frac{1}{2}$  lb.  $\times 13$   
 $= 4972\frac{1}{2}$  lb.;  $4972\frac{1}{2}$  lb.  $\times .08 = \$ 397.80$ ;  $\$ 397.80 \times$   
 $.30 = \$ 119.34$  Ans.
7.  $1376 \times \$ 4.84 = \$ 6659.84$ ;  $\$ 6659.84 \times .30 = \$ 1997.-$   
 $95, 2$  Ans.
8.  $\$ 2340 \times .80 = \$ 1872$  Ans.

### ASSESSMENT OF TAXES.

(ART. 227, p. 228.)

(2.)

- $\$ 1.25 \times 600 = \$ 750$ , amount assessed on the polls.  
 $\$ 3600 - \$ 750 = \$ 2850$ , amount to be assessed on the property.  
 $\$ 560,000 + \$ 152,500 = \$ 712,500$ , amount of taxable property.  
 $\$ 2850 \div 712,500 = .004$ , tax on  $\$ 1.00$ .

\$ 4100  $\times$  .004 = \$ 16.40, B's tax on real estate.

\$ 1800  $\times$  .004 = \$ 7.20, B's tax on personal property.

\$ 1.25  $\times$  4 = \$ 5.00, B's tax on 4 polls.

\$ 16.40 + \$ 7.20 + \$ 5.00 = \$ 28.60, B's tax.

(3.)

\$ 15,800  $\times$  .004 = \$ 63.20 Ans.

(4.)

\$ 40,000  $\times$  .004 = \$ 160, tax on D's real estate.

\$ 23,600  $\times$  .004 = \$ 94.40, tax on D's personal property.

\$ 1.25  $\times$  3 = \$ 3.75, D's tax for 3 polls.

\$ 160 + \$ 94.40 + \$ 3.75 = \$ 258.15, amount of D's tax, Ans.

(ART. 228, p. 229.)

(1.)

\$ 1.50  $\times$  500 = \$ 750.00, amount assessed on the polls.

\$ 3900 - \$ 750 = \$ 3150, amount to be assessed on the property.

\$ 840,000 + \$ 210,000 = \$ 1,050,000, am't of taxable property.

\$ 3150  $\div$  1,050,000 = \$ .003, assessment on \$ 1.00.

(3.)

\$ 3175 Tax on \$ 9000 = \$ 27.00

\$ 6535 " 700 = 2.10

\$ 9710 " 10 = .03

" 6 polls = 9.00

Ans. \$ 38.13

(4.)

Tax on \$ 7000 = \$ 21.00

" 900 = 2.70

" 80 = .24

Ans. \$ 23.94

(5.)

Tax on \$ 4000 = \$ 12.00

" 700 = 2.10

" 90 = .27

" 2 polls = 3.00

Ans. \$ 17.37

\$ 9280

\$ 3600

\$ 12880

(6.)

Tax on \$ 12000 = \$ 36.00

" 800 = 2.40

" 80 = .24

" 4 polls = 6.00

Ans. \$ 44.64

## EQUATION OF PAYMENTS.

(2.)	(ART. 230, p. 231.)	(3.)
\$ 250 × 4 = 1000		\$ 390 × 3 = 1170
\$ 350 × 8 = 2800		\$ 812 × 6 = 1872
\$ 400 × 12 = 4800		\$ 260 × 8 = 2080
\$ 1000    1000)8600(8mo.		\$ 598 × 10 = 5980
8000		\$ 1560   1560)11102(7 <sup>21</sup> / <sub>80</sub> mo.
600		10920
80		182
1000)18000(18da.		1560 = 7 <sup>21</sup> / <sub>80</sub>
18000		

Ans. 8mo. 18d.

(4.)	(5.)
\$ 1000	\$ 1250
\$ 1000 × 12 = 12000	\$ 1250 × 6 = 7500
\$ 2000 × 24 = 48000	\$ 1000 × 9 = 9000
\$ 4000    4000)60000(15mo.	\$ 1500 × 12 = 18000
	\$ 5000    5000)34500(6mo.
	30000
	4500
	30
	5000)135000(27da.
	10000
	35000
	35000

(ART. 231, p. 233.)

(2.)	
Due April 15, \$ 96.46	
“ 23, 49.63 × 8 = 39704	
May 1, 175.80 × 16 = 281280	
“ 11, 78.39 × 26 = 203814	
Sept. 19, 114.92 × 157 = 1804244	
\$ 515.20    51520)2329042(45+da.	
	206080
	268242
	257600
Ans. May 30, or in 45da.	10642

(3.)

Due May 7, 1854, \$ 375.60

Aug. 18, " 687.25  $\times$  103 = 7078675Dec. 7, " 568.50  $\times$  214 = 12165900March 1, 1855, 100.00  $\times$  298 = 2980000" 25, " 300.00  $\times$  322 = 9660000Aug. 5, " 675.75  $\times$  455 = 30746625

\$ 2707.10 270710) 29631200(231+da.

541420

848920

812130

367900

270710

Ans. Dec. 24, or in 231da.

97190

(4.)

Due April 1, 1857, \$ 436.50

" 11, " 129.50  $\times$  10 = 129500July 15, " 132.00  $\times$  105 = 1386000Sept. 1, " 405.00  $\times$  153 = 6196500" 5, " 72.00  $\times$  157 = 1130400Oct. 25, " 91.00  $\times$  207 = 1883700Mar. 1, 1858, 120.00  $\times$  334 = 4008000

\$ 1386.00 138600) 14734100(106+da.

138600

874150

831600

42550

Ans. July 16, or in 106da.

(5.)

Due July 1, 1854, \$300	=	
Nov. 1, " 500	$\times 4 =$	2000
March 1, 1855, 200	$\times 8 =$	1600
Oct. 1, " 800	$\times 15 =$	12000
April 1, 1857, 400	$\times 33 =$	13200
July 1, " 900	$\times 36 =$	32400
Aug. 1, " 100	$\times 37 =$	3700
\$ 3200	3200)64900(20mo. 8da.	
	6400	
	<u>900</u>	
	30	
	3200(27000(8+da.	
	<u>25600</u>	
Ans. March 9, 1856.	1400	

(ART. 232, p. 234.)

(2.) March 11, 1855 + 4 months =

July 11, 1855. 1855.

Dr. \$ 1850.	April 7, \$ 400	$\times 95 =$	38000	Cr
	May 15, 270	$\times 57 =$	15390	
	June 20, 350	$\times 21 =$	7350	
	\$ 1020		\$ 60740	

\$ 1850 - \$ 1020 = \$ 830; \$ 60740  $\div$  \$ 830 = 73 days.

July 11 + 73 = September 22, 1855, Ans.

(3.) June 12, 1855 + 8 months =

Feb. 12, 1856

Dr. \$1200.	Sept. 1, \$ 400	$\times 164 =$	65600	Cr.
	Nov. 1, 200	$\times 103 =$	20600	
	Dec. 1, 100	$\times 73 =$	7300	
	\$ 700		\$ 93500	

\$ 1200 - \$ 700 = 500; 93500  $\div$  500 = 187 days.

Feb. 12 + 187 = August 17, 1856, Ans.

(4.) September 25, 1855 + 6 months =

March 25, 1856.

Dr. \$ 2838.	Sept. 25, 1855, \$ 1000 × 182 =	182000	Cr.
	Nov. 1, 800 × 145 =	116000	
	Dec. 21, 600 × 95 =	57000	
		<u>\$ 2400</u>	
		<u>\$ 355000</u>	

\$ 2838 - \$ 2400 = \$ 438 ; 355000 ÷ 438 = 811 days.

March 25, 1856 + 811 days = June 14, 1858, Ans.

(5.) March 20, 1855 + 6 months =

Sept. 20, 1855.

Dr. \$ 2000.	March 20, 1855, \$ 500 × 184 =	92000	Cr.
	May 10, 350 × 133 =	46550	
	June 7, 400 × 105 =	4200	
		<u>\$ 1250</u>	
		<u>\$ 180550</u>	

\$ 2000 - \$ 1250 = \$ 750 ; 180550 ÷ 750 = 241 days.

September 20, 1855 + 241 days = May 18, 1856, Ans.

## COMPOUND EQUATION OF PAYMENTS.

(ART. 233, p. 236.)

(2.) Debits.

Credits.

Feb. 16, \$ 375.80	Mar. 20, \$ 800
Apr. 8, 432.18 × 51 = 2204118	July 4, 200.00 × 106 = 2120000
May 17, 320.15 × 90 = 2881350	Dec. 17, 371.50 × 272 = 10094900
July 13, 158.12 × 147 = 2324264	Mar. 25, 1855, 85.20 × 370 = 3152400
<u>1286 25</u>	<u>956.70</u>
<u>7409832</u>	<u>15367200</u>
	<u>95670</u>
	<u>161 da.</u>
7409832 ÷ 128625 = 58 days. Feb.	128625 - 95670 = 32955.
16 + 58 = April 15 ; April 15 +	<u>580020</u>
6 m. = Oct. 15, 1854.	<u>574020</u>
	<u>60000</u>

March 20 + 161 days = August 28.



From Aug. 28 to Oct. 15 = 48 days ;  $\$956.70 \times 48 = 4592160$  ;  $4592160 \div 32955 = 139$  days. Oct. 15, 1854 + 139 days = March 3, 1855, Ans.

(3.)

<i>Dr.</i> Edward Doton in account with Daniel Stetson.				<i>Cr.</i>	
1855			1855		
May 1,	To Merchandise	\$ 500	Mar. 7,	By Pleasure Boat	\$ 400
May 15,	" Timber	400	April 2,	" Merchandise	200
June 14,	" Horse	300	May 6,	" "	300
July 24,	" Labor	100	June 13,	" Carriage	120
		<u>\$1300</u>			<u>\$1020</u>

## OPERATION.

Debits.		Credits.	
May 1,	\$ 500	March 7,	\$ 400
May 15,	$400 \times 14 = 5600$	April 2,	$200 \times 26 = 5200$
June 14,	$300 \times 44 = 13200$	May 6,	$300 \times 60 = 18000$
July 24,	$100 \times 84 = 8400$	June 13,	$120 \times 98 = 11760$
	<u>\$ 1300</u> <u>27200</u>		<u>\$ 1020</u> <u>\$ 34960</u>
$27200 \div 1300 = 21$ days. May 1 + 21 = May 22 ; May 22 + 6 months = Nov. 22, 1855.		$34960 \div 1020 = 34$ days ; March 7 + 34 = April 10 ; April 10 + 6 mo. = Oct. 10, 1855. Nov. 22 — Oct. 10 = 43 days.	

$\$1300 - \$1020 = \$280$  ;  $\$1020 \times 43 = 43860$ .  $\$43860 \div 280 = 157$  days ; Nov. 22, 1855 + 157 days = April 27, 1856.

## SIMPLE PROPORTION.

5. (ART. 245, p. 242.) 63gal. : 9gal. ::  $\$14.49$  :  $\$2.07$  Ans.
6. 19A. : 97A. ::  $\$337.25$  :  $\$1721.75$  Ans.
7. 11da. : 47da. :: 319 miles : 1363 miles, Ans.
8. 15bar. : 79bar. ::  $\$120$  :  $\$632$  Ans.
9. 3 days : 12 days :: 9 horses : 36 horses, Ans.
10. 7gal. : 27gal. ::  $\$5.88$  :  $\$22.68$  Ans.
11. 9lb. : 147lb. ::  $\$10.80$  :  $\$176.40$  Ans.
12. 9 tons : 27 tons ::  $\$85.95$  :  $\$257.85$  Ans.
13. 15 tons : 765 tons ::  $\$105$  :  $\$5355$  Ans.
14. 16hhd. : 176hhd. ::  $\$320$  :  $\$3520$  Ans.
15. 15cwt. 3qr. 17lb. = 1592lb. : 76cwt. 2qr. 19lb. = 7669lb. ::  $\$124.67$  :  $\$600.56 +$  Ans.

16. 1m. : 32m. :: 2m. 8sec. = 128sec. : 4096sec. = 1h. 8m. 16sec. Ans.
17. 1h. = 3600sec. : 9h. 45m. 19sec. = 35119sec. :: 3m. 7fur. 18rd. = 1258rd. : 12272 + rd. = 38m. 2fur. 32 + rd. Ans.
18. 21 — 15 = 6rd. : 21rd. :: 96rd. : 336rd. Ans.
19. 4 + 5 = 9 men : 5 men :: 12h. : 6 $\frac{1}{2}$ h. Ans.
20. 10 — 3 = 7 men : 10 men :: 63da. : 90da. Ans.
21. \$ 7.50 : \$ 5.00 :: 5oz. : 3 $\frac{1}{3}$ oz. Ans.
22. 13h. : 14h. :: 10da. : 10 $\frac{1}{3}$ da. Ans.
23. 40lb. : 79lb. :: 29lb. : 57 $\frac{1}{4}$ lb. Ans.
26. 11 $\frac{1}{4}$ yd. : 100yd. :: 4 $\frac{7}{11}$ yd. =  $\frac{52}{11}$  : 1 $\frac{10}{11}$  ::  $\frac{11}{52}$  =  $\frac{5}{19}$   $\times$  1 $\frac{10}{11}$   $\times$   $\frac{11}{52}$  = 2 $\frac{5}{19}$  = 39 $\frac{18}{19}$ yd. Ans.
27. 48da. : 36da. :: 144 men : 108 men ; 144 — 108 = 36 men, Ans.
28. 

d.	d.	w.	w.
6	: 1	: 1	: $\frac{1}{6}$ , the part James will do in one day.
8	: 1	: 1	: $\frac{1}{8}$ , the part John will do in one day.
$\frac{1}{6} + \frac{1}{8}$	= $\frac{7}{24}$ ,	the part James and John will do in one day.	
$\frac{7}{24}$ w.	: 1w. :	1da. :	3 $\frac{3}{4}$ da. Ans.
29. 10da. : 1da. :: 1w. :  $\frac{1}{10}$ w. = part Atwood would do in a day.  
       7da. : 1da. :: 1w. :  $\frac{1}{7}$ w. = part Jerry and his father would do in a day.  
       6d. : 1da. :: 1w. :  $\frac{1}{6}$ w. = part Jacob and his father would do in a day.  
        $\frac{1}{7} - \frac{1}{10} = \frac{3}{70}$  = part Jerry would do in a day.  
        $\frac{1}{6} - \frac{1}{10} = \frac{1}{15}$  = part Jacob would do in a day.  
        $\frac{3}{70} + \frac{1}{15} = 2\frac{3}{10}$  = part Jerry and Jacob would do in a day.  
       2 $\frac{3}{10}$ w. : 1w. :: 1da. : 9 $\frac{3}{10}$  days, Ans.
31. \$ 5.00  $\times$  40 = \$ 200.00, price given for the cloth ;  
       1.00 : 1.15 :: \$ 200.00 : \$ 230.00 Ans.
32. 1.00 : 0.70 :: \$ 175.00 : \$ 122.50 Ans.
33. \$ 6.00 — \$ 5.00 = \$ 1.00 ;  
       \$ 5.00 : \$ 1.00 :: 100 : 20 per cent. Ans.
34. \$ 15.00 — \$ 12.00 = \$ 3.00 ;  
       \$ 15.00 : \$ 3.00 :: 100 : 20 per cent. Ans.

35. \$ 0.25 : \$ 27.50 :: 1 gal. : 110 gallons. Ans.  
 36. \$ 15.75 : \$ 1728 :: 1 A. : 109 A. 2 R. 34 p. Ans.  
 37. If the first cock will empty the cistern in 2 hours, in 1 hour  $\frac{1}{2}$  of it will be emptied. The second cock will empty  $\frac{1}{3}$  of it in 1 hour. The third cock will empty  $\frac{1}{4}$  of it in 1 hour. Therefore, in 1 hour,  $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} = \frac{13}{12}$  of the cistern will be emptied. And if  $\frac{13}{12}$  of the cistern be emptied in 1 hour,  $\frac{12}{13}$ , or the whole cistern, will be emptied in  $55\frac{5}{13}$  minutes;  $\frac{12}{13} : \frac{12}{13} :: 60 \text{ m.} : 55\frac{5}{13} \text{ m.}$  Ans.

## COMPOUND PROPORTION.

(ART. 247, p. 246.)

$$\begin{array}{r} (3.) \qquad \qquad \qquad 4 \qquad 2 \\ \$ 800 : \$ 100 \} \\ \$ 6 : \$ 32 \} :: 12 \text{ mo.} : 8 \text{ mo.} \text{ Ans. } \frac{100 \times 32 \times 12}{\$ 800 \times 6} = 8 \text{ mo.} \end{array}$$

$$\begin{array}{r} (4.) \qquad \qquad \qquad 4 \qquad 2 \\ \$ 6 : \$ 32 \} \\ 8 \text{ mo.} : 12 \text{ mo.} \} :: \$ 100 : \$ 800 \text{ Ans. } \frac{32 \times 12 \times 100}{6 \times \$} = \$ 800 \end{array}$$

$$\begin{array}{r} (5.) \\ \$ 800 : \$ 100 \} \\ 8 \text{ mo.} : 12 \text{ mo.} \} :: \$ 32 : \$ 6, \text{ that is, 6 per cent. Ans.} \end{array}$$

$$\frac{100 \times 12 \times 32}{\$ 800 \times \$} = \$ 6.$$

$$\begin{array}{r} (6.) \\ 20 \text{ men} : 15 \text{ men} \} \\ 10 \text{ hours} : 15 \text{ hours} \} :: 60 \text{ days} : 67\frac{1}{2} \text{ days, Ans.} \end{array}$$

$$\frac{15 \times 15 \times 60}{20 \times 10} = 13\frac{1}{2} = 67\frac{1}{2} \text{ days.}$$

(7.)

$$\left. \begin{array}{l} 351 \text{ bu.} : 1404 \text{ bu.} \\ 2 \text{ w.} : 3 \text{ w.} \end{array} \right\} :: 939 \text{ men} : 5634 \text{ men, Ans.}$$

$$\frac{\overset{2}{\cancel{1404}} \times 3 \times 939}{351 \times 2} = 5634 \text{ men.}$$

(8.)

$$\left. \begin{array}{l} 8 \text{ men} : 12 \text{ men} \\ 13 \text{ weeks} : 52 \text{ weeks} \end{array} \right\} :: \$ 64 : \$ 384 \text{ Ans.}$$

$$\frac{12 \times \overset{4}{\cancel{52}} \times \overset{8}{\cancel{64}}}{8 \times 13} = \$ 384$$

(9.)

$$\left. \begin{array}{l} 8 \text{ horses} : 32 \text{ horses} \\ 24 \text{ days} : 48 \text{ days} \end{array} \right\} :: 42 \text{ bushels} : 336 \text{ bushels, Ans.}$$

$$\frac{\overset{4}{\cancel{32}} \times \overset{2}{\cancel{48}} \times 42}{8 \times 24} = 336 \text{ bushels.}$$

(10.)

$$\left. \begin{array}{l} 24 \text{ men} : 6 \text{ men} \\ 16 \text{ hours} : 9 \text{ hours} \\ 20 \text{ feet} : 200 \text{ feet} \\ 6 \text{ feet} : 16 \text{ feet} \\ 4 \text{ feet} : 6 \text{ feet} \end{array} \right\} :: 16 \text{ days} : 90 \text{ days, Ans.}$$

$$\frac{\overset{10}{\cancel{24}} \times 9 \times \overset{4}{\cancel{200}} \times \overset{4}{\cancel{16}} \times 6 \times \overset{4}{\cancel{16}}}{\overset{4}{\cancel{24}} \times \overset{4}{\cancel{16}} \times \overset{4}{\cancel{20}} \times 6 \times 4} = 90 \text{ days.}$$

(11.)

$$\left. \begin{array}{l} 15 \text{ days} : 20 \text{ days} \\ 9 \text{ hours} : 12 \text{ hours} \end{array} \right\} :: 117 \text{ miles} : 208 \text{ miles, Ans.}$$

$$\frac{\overset{4}{\cancel{20}} \times \overset{4}{\cancel{12}} \times \overset{13}{\cancel{117}}}{\overset{4}{\cancel{15}} \times 9} = 208 \text{ miles.}$$

$$\begin{array}{lcl}
 30 \text{ men} & : & 12 \text{ men} \\
 30 \text{ feet} & : & 300 \text{ feet} \\
 6 \text{ feet} & : & 8 \text{ feet} \\
 3 \text{ feet} & : & 6 \text{ feet} \\
 8 \text{ hours} & : & 12 \text{ hours}
 \end{array}
 \left. \begin{array}{l} \\ \\ \\ \\ \end{array} \right\} \begin{array}{l} (12.) \\ \\ \\ \\ \end{array} :: 15 \text{ days} : 240 \text{ days, Ans.}$$

$$\frac{12 \times 300 \times 8 \times 6 \times 12 \times 15}{30 \times 30 \times 6 \times 3 \times 8} = 240 \text{ days.}$$

$$\begin{array}{lcl}
 575 \text{ lb.} & : & 765 \text{ lb.} \\
 150 \text{ miles} & : & 32 \text{ miles}
 \end{array}
 \left. \begin{array}{l} \\ \end{array} \right\} \begin{array}{l} (13.) \\ \\ \end{array} :: \$ 24.58 : \$ 6.97 + \text{Ans}$$

$$\frac{765 \times 32 \times 24.58}{575 \times 150} = \frac{2005728}{2875} = \$ 6.97, \text{ Ans}$$

$$\begin{array}{lcl}
 \$ 1800 & : & \$ 600 \\
 \$ 9 & : & \$ 9
 \end{array}
 \left. \begin{array}{l} \\ \end{array} \right\} \begin{array}{l} (14.) \\ \\ \end{array} :: 6 \text{ months} : 2 \text{ months, Ans.}$$

$$\frac{600 \times 9 \times 6}{1800 \times 9} = 2 \text{ months.}$$

$$\begin{array}{lcl}
 20 \text{ cows} & : & 28 \text{ cows} \\
 8 \text{ weeks} & : & 12 \text{ weeks}
 \end{array}
 \left. \begin{array}{l} \\ \end{array} \right\} \begin{array}{l} (15.) \\ \\ \end{array} :: 3 \text{ tons} : 6\frac{3}{10} \text{ tons, Ans}$$

$$\frac{28 \times 12 \times 3}{20 \times 8} = \frac{1008}{160} = 6\frac{3}{10} \text{ tons.}$$

$$\begin{array}{lcl}
 12\frac{5}{11} \text{ men} & : & 5 \text{ men} \\
 30 \text{ acres} & : & 54 \text{ acres}
 \end{array}
 \left. \begin{array}{l} \\ \end{array} \right\} \begin{array}{l} (16.) \\ \\ \end{array} :: 10 \text{ days} : 7\frac{31}{137} \text{ days, Ans.}$$

$$\frac{5 \times 54 \times 10}{12\frac{5}{11} \times 30} = \frac{90}{137} = \frac{90}{137} \times \frac{11}{11} = \frac{990}{137} = 7\frac{31}{137} \text{ days.}$$

(17.)

18 men : 2 men } ::  $6\frac{1}{2}$  days : 14 days, Ans.  
 12 $\frac{1}{2}$  rods : 247 $\frac{2}{3}$  rods }

$$2 \times \frac{3213}{13} \times \frac{13}{2} = 14 \text{ days.}$$

$$\frac{13}{2} \times \frac{51}{4} = \frac{51}{2}$$

(18.)

24 men : 248 men }  
 9 hours : 11 hours }  
 7 hard. : 4 hard. } ::  $5\frac{1}{2}$  days : 132 days, Ans.  
 232 $\frac{1}{2}$  feet : 337 $\frac{1}{2}$  feet }  
 3 $\frac{3}{4}$  feet : 5 $\frac{3}{4}$  feet }  
 2 $\frac{1}{2}$  feet : 3 $\frac{1}{2}$  feet }

$$248 \times 11 \times 4 \times \frac{675}{2} \times \frac{4}{5} \times \frac{7}{2} \times \frac{11}{2} = 132 \text{ days.}$$

$$\frac{24}{4} \times \frac{9}{2} \times 7 \times \frac{465}{2} \times \frac{11}{2} \times \frac{7}{3}$$

### PROFIT AND LOSS.

3. (ART. 249, p. 249.) \$ 5.40  $\times$  40 = \$ 216, price paid;  $40 \times \frac{3}{4} = 30$ ; \$ 6.00  $\times$  30 = \$ 180;  $40 \times \frac{1}{4} = 10$ ;  $7 \times 10 = \$ 70$ ; \$ 180 + \$ 70 = \$ 250, price sold at; \$ 250 - \$ 216 = \$ 34; \$ 216 : \$ 34 :: 1.00 :  $15\frac{2}{3}$  per cent.,  
 Ans.
4. \$ 5  $\times$  50 = \$ 250, price paid; \$ 5.98  $\div$  1.04 = \$ 5.75,  
 present worth of \$ 5.98, due 8 months hence; \$ 5.75  $\times$

- 50 = \$ 287.50, price sold at; \$ 287.50 — \$ 250 = \$ 37.50; \$ 250 : \$ 37.50 :: 100 : 15 per cent. Ans.
- b.  $100 \times \$ 0.30 = \$ 30$ , price paid;  $100 - 30 = 70$ ;  $70 \times \$ 0.40 = \$ 28$ , price sold at;  $\$ 30 - \$ 28 = \$ 2$ ;  $\$ 30 : \$ 2 :: 100 : 6\frac{2}{3}$  per cent. Ans.
6.  $3000 \times \$ 1.12\frac{1}{2} = \$ 3375$ , price paid;  $3000 \times \$ 0.05 = \$ 150$ , cost of transportation;  $\$ 3375 + \$ 150 = \$ 3525$ , whole cost;  $3000 \times \$ 1.37\frac{1}{2} = \$ 4125$ , price sold at;  $\$ 4125 - \$ 3525 = \$ 600$ ;  $3525 : \$ 4125 :: 100 : 17\frac{1}{4}$  per cent. Ans.
7.  $7\frac{1}{11}$  rd. =  $\frac{8}{11}$  rd.;  $\frac{8}{11} \times \frac{8}{11} = \frac{64}{121}$  rd., contents of the lot;  
 $\frac{64}{121} \times \$ 5 = \$ \frac{320}{121}$ , price paid;  $\frac{64}{121}$  rd.  $\times \frac{9}{4} = \frac{1440}{121}$  ft.;  $14400 \text{ ft.} : 14400 \times \$ 0.05 = \$ 720 = \frac{8712}{121}$ ;  $\frac{8712}{121} - \frac{320}{121} = \frac{8392}{121}$ ;  $\frac{8392}{121} : \frac{320}{121} :: 100 : 172\frac{1}{4}$  per cent. Ans.
3. (ART. 250, p. 250.)  $120 \times \$ 0.30 = \$ 36.00$ , price paid;  $\$ 100 : \$ 90 :: \$ 36.00 : \$ 32.40$  Ans.
4. 8cwt. 3qr. 5lb. = 880lb.;  $\$ 100 : \$ 120 :: \$ 88 : \$ 105.60$ ;  $\$ 105.60 \div 880 = \$ 0.12$  per pound, Ans.
5.  $100 : \$ 112 :: \$ 1728 : \$ 1935.36$ ;  $\$ 1935.36 \times 1.04 = \$ 2012.77+$ , worth of \$ 1935.36, 8 months hence, Ans.
6.  $\$ 100 : \$ 110 :: \$ 4.00 : \$ 4.40$ , price sold at; 32gal. — 8gal. = 24gal.;  $\$ 4.40 \div 24 = \$ 0.18\frac{1}{3}$ , price per gallon, Ans.
7.  $\$ 90 \div 1.03 = \$ 87.37+$ , present worth of \$ 90, due 6 months hence;  $\$ 100 : \$ 120 :: \$ 87.37+ : \$ 104.84+$ , Ans.
8.  $\$ 11.50 \times 7 = \$ 80.50$ ;  $\$ 100 : \$ 85 :: \$ 80.50 : \$ 68.42+$ , Ans.
3. (ART. 251, p. 251.)  $100 - 62.50 = .37\frac{1}{2}$ ;  $.37\frac{1}{2} : 100 :: \$ 80 : \$ 213.33\frac{1}{3}$ , Ans.
4.  $1.00 + .20 = 1.20$ ;  $1.20 : 1.00 :: \$ 7.20 : \$ 6.00$  per cord, Ans.
5.  $1.00 + .18 = 1.18$ ;  $1.18 : 1.00 :: \$ 1600.00 : 1355.93+$ , Ans.
6.  $\$ 8 \times 17 = \$ 136$ ;  $\$ 136 \times .0155 = \$ 2.108$ , discount

- of \$ 136 for 3 months; \$ 136 — \$ 2.10,8 = \$ 133.89+,  
present worth of \$ 136, due 3 months hence;  $1.00 - .10 = .90$ ;  $.90 : 1.00 :: 133.89+ : \$ 148.76+$ , Ans.
2. (ART. 252, p. 252.)  $1.00 + .12 = 1.12$ ; \$ 0.28 : \$ 0.24 ::  $1.12 : .96$ ;  $1.00 - .96 = .04 = 4$  per cent. loss, Ans.
3.  $1.00 - .25 = .75$ ; \$ 37.50 : \$ 75 ::  $.75 : 1.50$ ;  $1.50 - 1.00 = .50 = 50$  per cent. gain, Ans.
4. \$ 1728 ÷ 1.045 = \$ 1653.58+, present worth of \$ 1728, due 9 months hence; \$ 1653.58+ : \$ 2000 ::  $1.10 : 1.33+$ ;  $1.33+ - 1.00 = .33+ = 33+$  per cent. gain, Ans.

## MISCELLANEOUS EXERCISES.

1. (p. 253.) \$ 84.00 — \$ 75.60 = \$ 8.40; \$ 84.00 : 8.40 ::  $1.00 : .10 = 10$  per cent. loss, Ans.
2.  $1.00 - .10 = .90$ ; \$ 75.60 : 97.44 ::  $.90 : 1.16$ ;  $1.16 - 1.00 = .16 = 16$  per cent. gain, Ans.
3.  $1.00 + .16 = 1.16$ ; \$ 97.44 : \$ 75.60 ::  $1.16 : .90$ ;  $1.00 - .90 = .10 = 10$  per cent. loss, Ans.  $1.16 : 1.00 :: \$ 97.44 : \$ 84$ , real value of the horse; \$ 84 — \$ 75.60 = \$ 8.40, actual loss, Ans.
4. \$ 5 ÷ \$ 1.045 = \$ 4.78+, present worth of 5, due 9 months hence;  $1.00 + .12 = 1.12$ ;  $1.00 : 1.12 :: \$ 4.78+ : \$ 5.35+$ , Ans.
5.  $1.00 + .10 = 1.10$ ;  $1.00 : 1.10 :: \$ 40 : \$ 44$ , price sold at; 120gal. — 20gal. = 100gal.; \$ 44.00 ÷ 100 = \$ 0.44 per gallon, Ans.
6. \$ 5 : \$ 7.50 ::  $1.00 : 1.50$ ;  $1.50 - 1.00 = .50 = 50$  per cent., Jones' gain; \$ 0.10 : \$ 0.14 ::  $1.00 : 1.40$ ;  $1.40 - 1.00 = .40 = 40$  per cent., Crosby's gain;  $50 - 40 = 10$  per cent., Jones' gain more than Crosby's, Ans.
7. \$ 0.30 × 40 = 12.00; 30 cents on the dollar =  $\frac{30}{100}$  of the sum to be paid;  $\$ 12.00 \times \frac{30}{100} = 3.60$ , price received for 40gal.; 160gal. — 40gal. = 120gal.;  $0.35 \times 120 = \$ 42.00$ , price received for 120gal.;  $\$ 42.00 + \$ 3.60 = \$ 45.60$ , price received for 160gal.;  $1.00 + .10 = 1.10$ ;  $1.10 : 1.00 :: 45.60 : \$ 41.45+$ , Ans.



8.  $1.00 - .10 = .90$ ;  $.90 : 1.00 :: \$75.60 : \$84.00$ , real value of the horse;  $1.00 + .16 = 1.16$ ;  $1.00 : 1.16 :: \$84 : \$97.44$ , received for the horse;  $\$97.44 - \$75.60 = \$21.84$ ;  $\$75.60 : \$21.84 :: 1.00 : .28\frac{2}{3} = 28\frac{2}{3}$  per cent. gained, Ans.
9.  $1\frac{1}{2}$  yd.  $= 1.75$ ; 5 per cent.  $= \frac{5}{100}$ ;  $1\frac{1}{2} - \frac{5}{100} = 1\frac{25}{100}$ ;  $1.75 \text{ yd.} \times \frac{25}{100} = 1.6625 \text{ yd.}$ , width after shrinking;  $70 \text{ yd.} \times \frac{25}{100} = 66.5 \text{ yd.}$ , length after shrinking;  $66.5 \text{ yd.} \times 1.6625 = 110.55+$  square yards after shrinking;  $\$4.50 \times 70 = \$315.00$ , price paid;  $1.00 + .12 = 1.12$ ;  $1.00 : 1.12 :: \$315.00 : \$352.80$ , price sold at;  $352.80 \div 110.55+ = \$3.19+$ , price per sq. yd. Ans.

### PARTNERSHIP, OR COMPANY BUSINESS.

(ART. 254, p. 255.)

(2.)

A's stock, \$ 6000	$\frac{6000}{20000} = \frac{3}{10}$ , A's fractional part.	
B's stock, \$ 9000	$\frac{9000}{20000} = \frac{9}{20}$ , B's fractional part.	
C's stock, \$ 5000	$\frac{5000}{20000} = \frac{1}{4}$ , C's fractional part.	
<u>          \$ 20000</u>		
\$ 840	\$ 840	\$ 840
<u>      3</u>	<u>      9</u>	<u>      1</u>
10)2520	20)7560	4)840
<u>          \$ 252, A's gain.</u>	<u>          \$ 378, B's gain.</u>	<u>          \$ 210, C's gain.</u>

(3.)

Parker, \$8750	$\frac{8750}{19360} = \frac{875}{1936}$ , Parker's part.
Dole, \$3610	$\frac{3610}{19360} = \frac{361}{1936}$ , Dole's part.
Gage, \$7000	$\frac{7000}{19360} = \frac{700}{1936}$ , Gage's part.
\$19360	
	\$6875 - \$375 = \$6500
$\frac{\$6500 \times 875}{1936} = \$2937.75\frac{125}{121}$	= Parker's dividend.
$\frac{\$6500 \times 361}{1936} = \$1212.03\frac{62}{121}$	= Dole's dividend.
$\frac{\$6500 \times 700}{1936} = \$2350.20\frac{50}{121}$	= Gage's dividend.

(4.)

A's debt \$ 500  $\frac{500}{2000} = \frac{1}{4}$ , A's fractional part.B's debt \$ 386  $\frac{386}{2000} = \frac{193}{1000}$ , B's fractional part.C's debt \$ 988  $\frac{988}{2000} = \frac{247}{500}$ , C's fractional part.D's debt \$ 126  $\frac{126}{2000} = \frac{63}{1000}$ , D's fractional part.\$ 2000

$$\frac{\$ 100 \times 1}{4} = \$ 25.00, \text{ A's part.} \quad \left| \quad \frac{\$ 100 \times 247}{500} = \$ 49.40, \text{ C's part.}$$

$$\frac{\$ 100 \times 193}{1000} = \$ 19.30, \text{ B's part.} \quad \left| \quad \frac{\$ 100 \times 63}{1000} = \$ 6.30, \text{ D's part.}$$

(5.)

The whole gain is \$ 90; but C's gain is \$ 30; A and B's gain, therefore, is \$ 90 — \$ 30 = \$ 60; A's stock being \$ 700, his share of the gain will be  $\frac{700}{1000} = \frac{7}{10}$  of \$ 60 = \$ 42. B's stock being \$ 300, his share of the gain will be  $\frac{300}{1000} = \frac{3}{10}$  of \$ 60 = \$ 18. As the stock of each person in the firm bears the same proportion to his gain as the other, and as A's gain is \$ 42, and his stock \$ 700, therefore \$ 42 A's gain : \$ 700 A's stock :: \$ 30 C's gain : \$ 500 C's stock. Then \$ 500 ÷ 100 = \$ 5.00, value of C's flour per barrel.

## STATEMENT.

$$\begin{aligned} \$ 1000 : \$ 60 :: \$ 700 : \$ 42, \text{ A's gain,} \\ \$ 1000 : \$ 60 :: \$ 300 : \$ 18, \text{ B's gain,} \end{aligned} \quad \left. \vphantom{\begin{aligned} \$ 1000 : \$ 60 :: \$ 700 : \$ 42, \\ \$ 1000 : \$ 60 :: \$ 300 : \$ 18, \end{aligned}} \right\} \text{Ans.}$$

$$\$ 42 : \$ 700 :: \$ 30 : \$ 500, \text{ C's stock.}$$

$$\$ 500 \div 100 = \$ 5.00, \text{ value of C's flour per barrel, Ans.}$$

(ART. 255, p. 256.)

(2.)

$$\$ 700 \times 5 = 3500 \quad \frac{3500}{13300} = \frac{35}{133}, \text{ A's fraction.}$$

$$\$ 800 \times 6 = 4800 \quad \frac{4800}{13300} = \frac{48}{133}, \text{ B's fraction.}$$

$$\$ 500 \times 10 = 5000 \quad \frac{5000}{13300} = \frac{50}{133}, \text{ C's fraction.}$$

\$ 13300

$$\frac{\$ 899 \times 35}{133} = \$ 105, \text{ A's gain.} \quad \frac{\$ 899 \times 48}{133} = \$ 144, \text{ B's gain.}$$

$$\frac{\$ 899 \times 50}{133} = \$ 150, \text{ C's gain.}$$

(3.)

Johnson's stock,  $\$ 1000 \times 6 = 6000$ 500

$$\frac{\$ 1000 \times 6}{133} = \frac{\$ 6000}{133}, \text{ Johnson.}$$

$$\frac{\$ 1500 \times 6}{6} = 9000$$

\$ 15000Hyde's stock,  $\$ 800 \times 4 = 3200$ 400

$$\frac{\$ 1200 \times 6}{6} = 7200$$

$$\frac{\$ 800 \times 4}{133} = \frac{\$ 3200}{133}, \text{ Hyde.}$$

500

$$\frac{\$ 700 \times 2}{2} = 1400$$

\$ 11800Tyler's stock,  $\$ 1200 \times 7 = 8400$ 300

$$\frac{\$ 1200 \times 7}{133} = \frac{\$ 8400}{133}, \text{ Tyler.}$$

$$\frac{\$ 1500 \times 3}{3} = 4500$$

\$ 1500020011800

$$\frac{\$ 1700 \times 2}{2} = 3400$$

16300\$ 16300\$ 43100

$$\frac{\$ 1000 \times 150}{431} = \$ 348.02, \text{ Johnson's gain.}$$

$$\frac{\$ 1000 \times 118}{431} = \$ 273.78, \text{ Hyde's gain.}$$

$$\frac{\$ 1000 \times 163}{431} = \$ 378.19, \text{ Tyler's gain.}$$

(4.)

The stock in trade is a horse and chaise to ride to Newburyport and back; the whole distance being 30 miles. The expense for the horse and chaise may be considered the "loss;" and the

proportional part which each rode, the "time." Now, by the rule, each man is to bear his share of the loss (expense) in proportion as he has the use of the stock in trade (horse and chaise). Morse had the use of the whole stock in trade for the first 4 and last 4 miles, for which he must pay  $\frac{8}{30} = \frac{4}{15}$  of \$ 3.00 = \$ 0.80. For the remaining part of the distance, 22 miles, the expense was  $\frac{22}{30} = \frac{11}{15}$  of \$ 3.00 = \$ 2.20. Of this sum, Jones and Morse will pay equal parts = \$ 2.20  $\div$  2 = \$ 1.10. Morse will therefore pay \$ 0.80 + \$ 1.10 = \$ 1.90, and Jones \$ 1.10.

$$\frac{4}{15} + \frac{11}{15} \times \frac{1}{2} = \frac{19}{30}, \text{ Morse's product.}$$

$$\frac{11}{15} \times \frac{1}{2} = \frac{11}{30}, \text{ Jones' product.}$$

$$\frac{19}{30}, \text{ sum of the products.}$$

$$\frac{19}{30} : \frac{11}{30} :: \$ 3.00$$

$$\underline{19}$$

$$2700$$

$$\underline{300}$$

$$30)5700 (\$ 1.90 = \text{Morse's share of the expense.}$$

$$\underline{30}$$

$$270$$

$$\underline{270}$$

$$0$$

$$\frac{19}{30} : \frac{11}{30} :: \$ 3.00$$

$$\underline{11}$$

$$30)3300 (\$ 1.10 = \text{Jones' share of the expense.}$$

$$\underline{30}$$

$$30$$

$$\underline{30}$$

$$0$$

(5.)

As Jones' capital was invested 12 months and Cotton's but 9 months, Cotton's capital must be  $\frac{4}{3}$  of Jones' capital.

$$9 \text{ months} : 12 \text{ months} :: \$ 1000 : \$ 1333.33\frac{1}{3} \text{ Ans.}$$

(6.)

$$\$96 \div 8 = \$12, \text{ S's gain in 1 mo. } \frac{1}{4} = \text{S's share of stock.}$$

$$\$90 \div 6 = \$15, \text{ C's gain in 1 mo. } \frac{1}{4} = \text{C's share.}$$

$$\$80 \div 4 = \$20, \text{ D's gain in 1 mo. } \frac{2}{9} = \text{D's share.}$$

\$47 whole gain.

$$\$4700 \times \frac{1}{4} = \$1200, \text{ S's stock, } \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{Ans.}$$

$$\$4700 \times \frac{1}{4} = \$1500, \text{ C's stock, } \left. \begin{array}{l} \\ \\ \end{array} \right\}$$

$$\$4700 \times \frac{2}{9} = \$2000, \text{ D's stock, } \left. \begin{array}{l} \\ \\ \end{array} \right\}$$

(7.)

$$\$300 \times 7 = \$2100 \quad \frac{3188}{3188} = \frac{3}{8}, \text{ A's part.}$$

$$\$500 \times 8 = \$4000 \quad \frac{4000}{4000} = \frac{8}{17}, \text{ B's part.}$$

$$\$200 \times 12 = \$2400 \quad \frac{2400}{2400} = \frac{3}{5}, \text{ C's part.}$$

\$8500

$$\$85 \times \frac{3}{8} = \$21, \text{ A's gain, } \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{Ans.}$$

$$\$85 \times \frac{8}{17} = \$40, \text{ B's gain, } \left. \begin{array}{l} \\ \\ \end{array} \right\}$$

$$\$85 \times \frac{3}{5} = \$24, \text{ C's gain, } \left. \begin{array}{l} \\ \\ \end{array} \right\}$$

(8.)

$$\$10 \div 5 = \$2, \text{ A's gain in 1 mo. } \frac{2}{3} = \text{A's part of stock.}$$

$$\$12 \div 4 = \$3, \text{ B's gain in 1 mo. } \frac{2}{3} = \text{B's part.}$$

\$5

$$\$500 \times \frac{2}{3} = \$200, \text{ A's stock, } \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{Ans.}$$

$$\$500 \times \frac{2}{3} = \$300, \text{ B's stock, } \left. \begin{array}{l} \\ \\ \end{array} \right\}$$

(9.)

$$\$3000 \times 6 = \$18000 \quad \$6000 \times 8 = \$48000$$

$$\underline{\$2000} \quad \underline{\$3000}$$

$$\$5000 \times 6 = \$30000 \quad \$3000 \times 4 = \$12000$$

\$48000, A.

\$60000, B.

\$48000

$$\frac{48000}{108000} = \frac{4}{9}, \text{ A's share.}$$

60000

$$\frac{60000}{108000} = \frac{5}{9}, \text{ B's share.}$$

\$108000

$$\$1080 \times \frac{4}{9} = \$480, \text{ A's gain, } \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{Ans.}$$

$$\$1080 \times \frac{5}{9} = \$600, \text{ B's gain, } \left. \begin{array}{l} \\ \\ \end{array} \right\}$$

(10.)

$$\begin{array}{rcl}
 5 \times 4 = 20 & \frac{20}{150} = \frac{2}{15}, \text{ A.} \\
 6 \times 8 = 48 & \frac{48}{150} = \frac{8}{25}, \text{ B.} \\
 8 \times 5 = 40 & \frac{40}{150} = \frac{4}{15}, \text{ C.} \\
 3 \times 14 = 42 & \frac{42}{150} = \frac{7}{25}, \text{ D.} \\
 \hline
 & 150
 \end{array}$$

$$\left. \begin{array}{l}
 \$ 50 \times \frac{2}{15} = \$ 6.66\frac{2}{3}, \text{ A's share,} \\
 \$ 50 \times \frac{8}{25} = \$ 16.00, \text{ B's share,} \\
 \$ 50 \times \frac{4}{15} = \$ 13.33\frac{1}{3}, \text{ C's share,} \\
 \$ 50 \times \frac{7}{25} = \$ 14.00, \text{ D's share,}
 \end{array} \right\} \text{Ans.}$$

(11.)

$$\begin{array}{rcl}
 30 \times 50 = 1500 & \frac{1500}{5910} = \frac{50}{197}, \text{ A.} \\
 50 \times 36 = 1800 & \frac{1800}{5910} = \frac{60}{197}, \text{ B.} \\
 58 \times 45 = 2610 & \frac{2610}{5910} = \frac{87}{197}, \text{ C.} \\
 \hline
 & 5910
 \end{array}$$

$$\$ 7500 - \$ 112.50 = \$ 7387.50.$$

$$\left. \begin{array}{l}
 \$ 7387.50 \times \frac{50}{197} = \$ 1875, \text{ A receives,} \\
 \$ 7387.50 \times \frac{60}{197} = \$ 2250, \text{ B receives,} \\
 \$ 7387.50 \times \frac{87}{197} = \$ 3262.50 + \$ 112.50 = \$ 3375, \text{ C}
 \end{array} \right\} \text{[receives,] Ans.}$$

## REDUCTION OF CURRENCIES.

2. (ART. 258, p. 260.)  $144\text{£. } 7\text{s. } 6\text{d.} = 144.375\text{£.}; 144.375\text{£.} \times \frac{3}{10} = \$ 481.25 \text{ Ans.}$

3.  $74\text{£. } 1\text{s. } 6\text{d.} = 74.075\text{£.}; 74.075\text{£.} \div \frac{2}{5} = \$ 185.18\frac{1}{2} \text{ Ans.}$

4.  $129\text{£.} \div \frac{3}{8} = \$ 344 \text{ Ans.}$

5.  $84\text{£.} \div \frac{7}{10} = \$ 360 \text{ Ans.}$

6.  $144\text{£. } 4\text{s.} = 144.20\text{£.}; 144.20\text{£.} \div \frac{1}{4} = \$ 576.80 \text{ Ans.}$

7.  $257\text{£. } 8\text{s. } 6\text{d.} = 257.425\text{£.}; 257.425\text{£.} + \frac{25}{121}\text{£.} = \$ 1245.93,7 \text{ Ans.}$

2. (ART. 259, p. 261.)  $\$ 481.25 \times \frac{3}{10} = 144.375\text{£.} = 144\text{£. } 7\text{s. } 6\text{d.} \text{ Ans.}$

3.  $\$ 185.18\frac{1}{2} \times \frac{2}{5} = 74.075\text{£.} = 74\text{£. } 1\text{s. } 6\text{d.} \text{ Ans.}$

4.  $\$ 344 \times \frac{3}{4} = 129\text{£. Ans.}$
  5.  $\$ 360 \times \frac{2}{3} = 84\text{£. Ans.}$
  6.  $\$ 576.50 \times \frac{1}{4} = 144.125\text{£.} = 144\text{£. 2s. 6d. Ans.}$
  7.  $\$ 1245.93,7 \times \frac{2}{21} = 257.425\text{£.} = 257\text{£. 8s. 6d. Ans.}$
- 
1. (ART. 260, p. 261.)  $\$ .75 \times 123 = \$ 92.25 \text{ Ans.}$
  2.  $\$ 27.75 \div 185 = 150 \text{ francs, Ans.}$
  3.  $\$ 0.69 \times 121 = \$ 83.49 \text{ Ans.}$
  4.  $\$ 165.20 \div 40 = 413 \text{ florins, Ans.}$
  5.  $\$ 1.48 \times 216 = \$ 319.68 \text{ Ans.}$
  6.  $\$ 5187.90 \div 10 = 51879 \text{ reals plate, Ans.}$
- 
1. (ART. 263, p. 262.)  $1 - .015 = .985; \$ 452 \times .985 = \$ 445.22 \text{ Ans.}$
  2.  $\$ 1164 \times 1.01 = \$ 1175.64 \text{ Ans.}$
  3.  $1 - 0.025 = 0.975; \$ 400 \times 0.975 = \$ 3900 \text{ Ans.}$
  4.  $\frac{5}{8} \text{ of } 1 \text{ per cent.} = \$ 0.00625; \$ 1 - \$ 0.00625 = \$ 0.99375; \$ 450 \times \$ 0.99375 = \$ 447.18\frac{3}{4} \text{ Ans.}$
  5.  $\frac{1}{8} \text{ of } 1 \text{ per cent.} = 0.00125; 1 + .00125 = 1.00125; \$ 2517.70 \times 1.00125 = \$ 2520.84 + \text{Ans.}$
- 
2. (ART. 266, p. 264.)  $1\text{£.} + .085\text{£.} = 1.085\text{£.}; 1.085\text{£.} \times \frac{4}{9} = \$ 4.82\frac{2}{3}; \$ 4.82\frac{2}{3} \times 572.5 = \$ 2760.72\frac{2}{3} \text{ Ans.}$
  3.  $1200\text{£.} \times 1.0925 = 1311\text{£.}; 1311\text{£.} \times \frac{4}{9} = \$ 5826.66\frac{2}{3} \text{ Ans.}$
- 
2. (ART. 267, p. 265.)  $1\text{£.} + .085\text{£.} = 1.085\text{£.}; 1.085\text{£.} \times \frac{4}{9} = \$ 4.82\frac{2}{3}; \$ 1640 \div \$ 4.82\frac{2}{3} = 340\text{£. 1s. 10d. Ans.}$
  3.  $1\text{£.} + .10\text{£.} = £1.10; £1.10 \times \frac{4}{9} = \$ 4.96\frac{2}{3}; \$ 500 \div \$ 4.96\frac{2}{3} = 102\text{£. 5s. 5d. Ans.}$
- 
1. (ART. 269, p. 265.)  $2380\text{fr.} \div 5.15 = \$ 462.13 + \text{Ans.}$
  2.  $3000\text{fr.} \div 5.175 = \$ 5797.10 + \text{Ans.}$
  3.  $62500\text{fr.} \div 5.12 = \$ 12207.03 + \text{Ans.}$
- 
1. (ART. 270, p. 266.)  $\$ 2500 \times 5.12 = 12800 \text{ francs, Ans.}$
  2.  $\$ 700 \times 5.13 = 3591 \text{ francs, Ans.}$
  3.  $\$ 675 \times 5.16 = 3483 \text{ francs, Ans.}$

DUODECIMALS.

(ART. 272, p. 267.)

(1.)	(2.)	(3.)	(4.)
$\begin{array}{r} \text{ft.} \quad \text{in.} \quad \text{p.} \\ 12 \quad 6 \quad 9 \\ 14 \quad 7 \quad 8 \\ \hline 165 \quad 11 \quad 10 \\ 193 \quad 2 \quad 3 \end{array}$	$\begin{array}{r} \text{ft.} \quad \text{in.} \quad \text{p.} \\ 182 \quad 11 \quad 2 \quad 4 \\ 127 \quad 7 \quad 8 \quad 11 \\ \hline 291 \quad 5 \quad 11 \quad 10 \\ 602 \quad 0 \quad 11 \quad 1 \end{array}$	$\begin{array}{r} \text{ft.} \quad \text{in.} \quad \text{p.} \\ 204 \quad 7 \quad 9 \\ 114 \quad 10 \quad 6 \\ \hline 89 \quad 9 \quad 3 \end{array}$	$\begin{array}{r} \text{ft.} \quad \text{in.} \quad \text{p.} \\ 397 \quad 9 \quad 6 \quad 11 \quad 7 \\ 201 \quad 11 \quad 7 \quad 8 \quad 10 \\ \hline 195 \quad 9 \quad 11 \quad 2 \quad 9 \end{array}$

(ART. 274, p. 268.)

(2.)	(3.)
$\begin{array}{r} \text{ft.} \quad \text{in.} \\ 8 \quad 8 \\ 7 \quad 9 \\ \hline 57 \quad 9 \\ 6 \quad 2 \quad 3 \\ \hline 63 \quad 11 \quad 3 \end{array}$	$\begin{array}{r} \text{ft.} \quad \text{in.} \\ 12 \quad 9 \\ 9 \quad 11 \\ \hline 114 \quad 9 \\ 11 \quad 8 \quad 3 \\ \hline 126 \quad 5 \quad 3 \end{array}$

(4.)  
 $18 + 10 \times 2 \times 16\frac{1}{2} = 924\text{ft.}$ ,  
 distance round the garden; 2ft.  
 $+ 1\text{ft. } 6\text{in.} = 3\text{ft. } 6\text{in.}$ , width  
 of new ditch; 3ft.  $+ 1\text{ft.} = 4\text{ft.}$ ,  
 depth of new ditch; 3ft. 6in.  $\times$   
 $4 = 14\text{ft.}$ ;  $924\text{ft.} + 14\text{ft.} =$   
 $938\text{ft.}$ , length of the new ditch;  
 $3\text{ft. } 6\text{in.} \times 4 \times 938 = 13132$ ,  
 contents of the new ditch. As  
 the ditch is 2ft. wide, there must  
 be added  $2\text{ft.} \times 4 = 8\text{ft.}$  to the  
 distance round the garden, to  
 obtain the entire length of the  
 ditch,  $924\text{ft.} + 8\text{ft.} = 932\text{ft.}$ ;  
 $932\text{ft.} \times 3 \times 2 = 5592$  cubic  
 feet, in the old ditch;  $13132\text{ft.}$   
 $- 5592\text{ft.} = 7540$  cubic feet,  
 Ans.

(5.)
$\begin{array}{r} \text{ft.} \quad \text{in.} \quad \text{p.} \\ 12 \quad 6 \quad 6 \\ 11 \quad 2 \quad 6 \\ \hline 23 \quad 13 \quad 0 \\ 2 \quad 3 \quad 3 \\ \hline 46 \quad 16 \quad 3 \\ 7\frac{1}{2} \quad 2 \quad 3 \\ \hline 322 \quad 32 \quad 6 \\ 23 \quad 32 \quad 6 \\ \hline 9)345 \quad 27 \quad 4 \\ 38\frac{1}{2} \quad 9)117 \quad 7 \\ 13\frac{7}{108} \quad 13\frac{7}{108} \\ \hline 25\frac{2}{108} \text{yd. Ans.} \end{array}$



(ART. 275, p. 269.)

2. 1ft. 9)22ft. 2(12ft. 8in. Ans.

$$\begin{array}{r}
 21 \quad 0 \\
 \hline
 1 \quad 2 \quad 0 \\
 1 \quad 2 \quad 0 \\
 \hline
 \end{array}$$

3.  $17 \times 128 = 9600\text{ft.}$ 

$$\begin{array}{r}
 256\text{ft. } 0 \\
 4 \quad 6 \\
 \hline
 1024 \quad 0 \\
 128 \quad 0 \\
 \hline
 1152 \quad 0
 \end{array}$$

0)9600ft. 0(8ft. 4in. Ans.

$$\begin{array}{r}
 9216 \\
 384 \quad 0 \\
 384 \quad 0 \\
 \hline
 \end{array}$$

## INVOLUTION.

(ART. 277, p. 270.)

- |   |  |
|---|--|
| 1. $6 \times 6 = 36$ Ans.   | 5. $\frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} =$ |
| 2. $5 \times 5 \times 5 = 125$ Ans.   | $\frac{125}{243} = 62\frac{1}{27}$ Ans.  |
| 3. $4 \times 4 \times 4 \times 4 \times 4 \times 4 =$   | 6. $.25 \times .25 \times .25 = .015625$   |
| 4096 Ans.   | Ans.   |
| 4. $\frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} = \frac{1}{81}$ Ans. | 7. 17 Ans.   |
2. (ART. 278, p. 271.)  $5^1, 25^2, 125^3; 125^3 \times 25^2 \times 25^3 = 78125^7$
3.  $6^1, 36^2, 216^3; 216^3 \times 216^2 \times 216^3 = 10077696^9$  Ans. [Ans.]
4.  $7^1, 49^2, 343^3, 2401^4; 2401^4 \times 343^3 \times 343^3 \times 49^2 = 13841287201^{12}$
5.  $8^1, 64^2, 512^3; 512^3 \times 512^2 \times 64^2 = 16777216^8$  Ans. [Ans.]

$$6. \overset{1}{4}, \overset{2}{16}, \overset{3}{64}, \overset{4}{256}, \overset{5}{1024}; 1024 \overset{5}{\times} 1024 = 1048576 \overset{10}{\times} 1048576 \\ = 1099511627776 \text{ Ans.}$$

$$7. \overset{1}{3}, \overset{2}{9}, \overset{3}{27}, \overset{4}{81}, \overset{5}{243}, \overset{6}{729}, \overset{7}{2187}, \overset{8}{6561}, \overset{9}{19683}, \overset{10}{59049}; 59049 \overset{10}{\times} \\ 59049 \overset{10}{\times} 59049 = 205891182094649 \text{ Ans.}$$

## EXTRACTION OF THE SQUARE ROOT.

(ART. 281, p. 275.)

(3.)

$$\begin{array}{r} 516961(719 \\ \underline{49} \\ 141)269 \\ \underline{141} \\ 1429)12861 \\ \underline{12861} \end{array}$$

(4.)

$$\begin{array}{r} 182329(427 \\ \underline{16} \\ 82)223 \\ \underline{164} \\ 847)5929 \\ \underline{5929} \end{array}$$

(5.)

$$\begin{array}{r} 23804641(4879 \\ \underline{16} \\ 88)780 \\ \underline{704} \\ 967)7646 \\ \underline{6769} \\ 9749)87741 \\ \underline{87741} \end{array}$$

(6.)

$$\begin{array}{r} 10673289(3267 \\ \underline{9} \\ 62)167 \\ \underline{124} \\ 646)4332 \\ \underline{3876} \\ 6527)45689 \\ \underline{45689} \end{array}$$

(7.)

$$\begin{array}{r} 20894041(4571 \\ \underline{16} \\ 85)489 \\ \underline{425} \\ 907)6440 \\ \underline{6349} \\ 9141)9141 \\ \underline{9141} \end{array}$$

(8.)

$$\begin{array}{r} 42025(205 \\ \underline{4} \\ 405)2025 \\ \underline{2025} \end{array}$$

(9.)	(10.)	(11.)
1014049(1007	538(23.194+	71(8.426+
<u>1</u>	<u>4</u>	<u>64</u>
2007)014049	43)138	164)700
<u>014049</u>	<u>129</u>	<u>656</u>
	461)900	1682)4400
	<u>461</u>	<u>8364</u>
	4629)43900	16846)103600
(12.)	<u>41661</u>	<u>101076</u>
7(2.645+	46384)228900	2524
<u>4</u>	<u>185536</u>	
46)300	<u>83864</u>	
<u>276</u>		
524)2400	(13.)	(14.)
<u>2096</u>	.1024(.32	.3364(.58
5285)30400	<u>9</u>	<u>25</u>
<u>26425</u>	62)124	108)864
<u>8975</u>	<u>124</u>	<u>864</u>
(15.)		(16.)
.8950(.946+		.120409(.347
<u>81</u>		<u>9</u>
184)850		64)304
<u>736</u>		<u>256</u>
1886)11400		687)4809
<u>11816</u>		<u>4809</u>
<u>84</u>		

(17.)

$$\begin{array}{r}
 617\cancel{2}30\cancel{2}0.9\cancel{6}(7856.4 \\
 \underline{49} \\
 148)1272 \\
 \underline{1184} \\
 1565)8830 \\
 \underline{7825} \\
 15706)100520 \\
 \underline{94236} \\
 157124)628496 \\
 \underline{628496}
 \end{array}$$

(18.)

$$\begin{array}{r}
 9754.604\cancel{2}871\cancel{6}(98.7654 \\
 \underline{81} \\
 188)1654 \\
 \underline{1504} \\
 1967)15060 \\
 \underline{18769} \\
 19746)129142 \\
 \underline{118476} \\
 197525)1066637 \\
 \underline{987625} \\
 1975304)7901216 \\
 \underline{7901216}
 \end{array}$$

(ART. 282, p. 275.)

(1.)

$$\begin{array}{r}
 \sqrt{1225} \\
 49)7 \\
 \underline{49}
 \end{array}$$

(2.)

$$\begin{array}{r}
 \sqrt{8281} \\
 196)14 \\
 \underline{1} \\
 24)96 \\
 \underline{96}
 \end{array}$$

(3.)

$$\begin{array}{r}
 \sqrt{7569} \\
 3721)61 \\
 \underline{36} \\
 121)121 \\
 \underline{121}
 \end{array}$$

(4.)

$$\begin{array}{r}
 \sqrt{12769} \\
 1849)43 \\
 \underline{16} \\
 83)249 \\
 \underline{249}
 \end{array}$$

$$\begin{array}{r}
 529)23 \\
 \underline{4}
 \end{array}$$

$$\begin{array}{r}
 43)129 \\
 \underline{129}
 \end{array}$$

$\frac{7}{23}$  Ans.

$$\begin{array}{r}
 625)25 \\
 \underline{4}
 \end{array}$$

$$\begin{array}{r}
 45)225 \\
 \underline{225}
 \end{array}$$

$\frac{1}{25}$  Ans.

$$\begin{array}{r}
 7569)87 \\
 \underline{64}
 \end{array}$$

$$\begin{array}{r}
 167)1169 \\
 \underline{1169}
 \end{array}$$

$\frac{8}{17}$  Ans.

$$\begin{array}{r}
 12769)113 \\
 \underline{1}
 \end{array}$$

$$\begin{array}{r}
 21)27 \\
 \underline{21}
 \end{array}$$

223)669

$\frac{4}{113}$  Ans.

(5.)

$$60\frac{1}{8} = 7\frac{5}{8}$$

$$\begin{array}{r} 961 \overline{)31} \\ 9 \end{array}$$

$$61 \overline{)61}$$

$$\begin{array}{r} 61 \\ \hline \end{array}$$

$$16 \overline{)4}$$

$$\begin{array}{r} 16 \\ \hline \end{array}$$

$$7\frac{1}{8} = 7\frac{1}{8} \text{ Ans.}$$

(6.)

$$28\frac{5}{7} = 4\frac{1}{7}$$

$$1849 \overline{)43}$$

$$\begin{array}{r} 18 \\ \hline \end{array}$$

$$83 \overline{)249}$$

$$\begin{array}{r} 249 \\ \hline \end{array}$$

$$64 \overline{)8}$$

$$\begin{array}{r} 64 \\ \hline \end{array}$$

$$5\frac{3}{8} = 5\frac{3}{8} \text{ Ans.}$$

(7.)

$$47\frac{1}{2} = 9\frac{1}{2}$$

$$3025 \overline{)55}$$

$$\begin{array}{r} 25 \\ \hline \end{array}$$

$$105 \overline{)525}$$

$$\begin{array}{r} 525 \\ \hline \end{array}$$

$$64 \overline{)8}$$

$$\begin{array}{r} 64 \\ \hline \end{array}$$

$$6\frac{1}{2} = 6\frac{1}{2} \text{ Ans.}$$

(8.)

$$7\frac{1}{2} = .756842 + (.858 +$$

$$\begin{array}{r} 64 \\ \hline \end{array}$$

$$165 \overline{)968}$$

$$\begin{array}{r} 825 \\ \hline \end{array}$$

$$1708 \overline{)14842}$$

$$\begin{array}{r} 13664 \\ \hline \end{array}$$

$$\begin{array}{r} 678 \\ \hline \end{array}$$

(9.)

$$83\frac{1}{2} = 83.6666 + (9.14 +$$

$$\begin{array}{r} 81 \\ \hline \end{array}$$

$$181 \overline{)266}$$

$$\begin{array}{r} 181 \\ \hline \end{array}$$

$$1824 \overline{)8566}$$

$$\begin{array}{r} 7296 \\ \hline \end{array}$$

$$\begin{array}{r} 1270 \\ \hline \end{array}$$

(10.)

$$121\frac{1}{8} = 121.944444 + (11.042 +$$

$$\begin{array}{r} 1 \\ \hline \end{array}$$

$$21 \overline{)21}$$

$$\begin{array}{r} 21 \\ \hline \end{array}$$

$$2204 \overline{)9444}$$

$$\begin{array}{r} 8816 \\ \hline \end{array}$$

$$22082 \overline{)62844}$$

$$\begin{array}{r} 44164 \\ \hline \end{array}$$

$$\begin{array}{r} 18680 \\ \hline \end{array}$$

(11.)

$$\frac{339\frac{1}{2}}{462} = \frac{339\frac{1}{2}}{462} = \frac{1}{14}; \sqrt{\frac{1}{14}} = \frac{1}{\sqrt{14}} \text{ Ans.}$$

(12.)

$$\frac{76\frac{1}{2}}{1557\frac{1}{2}} = \frac{1557\frac{1}{2}}{76\frac{1}{2}} = \frac{1}{51}; \sqrt{\frac{1}{51}} = \frac{1}{\sqrt{51}}$$

## APPLICATION OF THE SQUARE ROOT.

(ART. 283, p. 276.)

1.  $\sqrt{226576} = 476$  Ans.
2. 640 acres = 102400 rods;  $\sqrt{102400} = 320$  rods, Ans.
3.  $125 \times 53 = 6625$ rd.;  $62\frac{1}{2} \times 34 = 2125$ rd.;  $37 \times 160 = 5920$ rd.;  $6625 + 2125 + 5920 = 14670$ rd.;  $\sqrt{14670} = 121.11 +$  rods, Ans.
4.  $242 \times 242 = 58564$  feet, area of the first lot;  $58564 \times 9 = 527066$ ;  $\sqrt{527076} = 726$  feet, Ans.
5.  $124A. \times 160 = 19840$  rods, area of the former pasture;  $4 : 5 :: 19840 : 24800$ , area of the latter;  $\sqrt{24800} = 157.48 +$ rd. Ans.
6.  $2 : 3 :: 216 : 324$ ;  $\sqrt{324} = 18$  trees in length;  $3 : 2 :: 216 : 144$ ;  $\sqrt{144} = 12$  trees in breadth;  $18 - 1 = 17$ ;  $17 \times 25 = 425$ ft.;  $12 - 1 = 11$ ;  $11 \times 25 = 275$ ft.;  $425 \times 275 = 116875$  sq. ft. Ans.
1. (ART. 288, p. 277.)  $40 \times 40 = 1600$ ;  $9 \times 9 = 81$ ;  $1600 + 81 = 1681$ ;  $\sqrt{1681} = 41$ ft. Ans.
2.  $360 \times 360 = 129600$ ;  $450 \times 450 = 202500$ ;  $129600 + 202500 = 332100$ ;  $\sqrt{332100} = 576.2 +$  miles, Ans.
3.  $60 \times 60 = 3600$ ft.;  $36 \times 36 = 1296$ ft.;  $3600 - 1296 = 2304$ ft.;  $\sqrt{2304} = 48$  feet, Ans.
4.  $120 \times 120 = 14400$ ft.;  $50 \times 50 = 2500$ ft.;  $14400 - 2500 = 11900$ ft.;  $\sqrt{11900} = 109.08 +$  feet, Ans.
5.  $160 + 20 = 180$ ;  $180 \times 180 = 32400$ ;  $500 \times 500 = 250000$ ;  $250000 - 32400 = 217600$ ;  $\sqrt{217600} = 466.47 +$ ;  $466.47 + - 100 = 366.47 +$  feet, Ans.
6.  $110 + 90 = 200$ ;  $300 \times 300 = 90000$ ;  $200 \times 200 = 40000$ ;  $90000 - 40000 = 50000$ ;  $\sqrt{50000} = 223.6 +$ ft.;  $223.6 + - 160 = 63.6 +$  feet, Ans.
7.  $60 \times 60 = 3600$ ;  $80 \times 80 = 6400$ ;  $3600 + 6400 = 10000$ ;  $\sqrt{10000} = 100$ ;  $70 \times 70 = 4900$ ;  $4900 + 6400 = 11300$ ;  $\sqrt{11300} = 106.3 +$ ;  $90 \times 90 = 8100$ ;  $8100 + 4900 = 13000$ ;  $\sqrt{13000} = 114.01 +$ ;  $8100 + 3600$

- $= 11700$ ;  $\sqrt{11700} = 108.16+$ ;  $100 + 106.3 + 114.01 + 108.16 = 428.47+$  rods, Ans.  
 8.  $24 \times 24 = 576\text{ft.}$ ;  $18 \times 18 = 324\text{ft.}$ ;  $12 \times 12 = 144$ ;  $576 + 324 + 144 = 1044\text{ft.}$ ;  $\sqrt{1044} = 32.3+$  feet, Ans.  
 2. (ART. 292, p. 279.)  $2 : 1 :: 16^2 : 128$ ;  $\sqrt{128} = 11.31+$  feet, Ans.  
 3.  $1 : 3 :: 11^2 : 363$ ;  $\sqrt{363} = 19.05+$  rods, Ans.  
 4.  $28.3 : 42.5 :: 6^2 : 54.06+$ ;  $\sqrt{54.06+} = 7.35+$  feet, Ans.  
 5.  $2000 : 4000 :: 3^2 : 18$ ;  $\sqrt{18} = 4.24+$  inches, Ans.  
 6.  $1000 : 5000 :: 4^2 : 80$ ;  $\sqrt{80} = 8.94+$  inches, Ans.  
 7.  $12^2 : 8^2 :: 72 : 32$  rods, Ans.  
 8.  $45^2 : 15^2 :: 950 : 105.55+$  square rods, Ans.  
 9.  $6^2 : 9^2 :: 1.178+ : 2.65+$  feet, Ans.  
 10.  $3^2 : 2^2 :: 20\frac{1}{4} : 9$  minutes, Ans.  
 11.  $\frac{3}{4} \times \frac{3}{4} = \frac{9}{16}$ ;  $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ ;  $\frac{9}{16} - \frac{1}{4} = \frac{5}{16}$ ;  $\frac{5}{16} : \frac{9}{16} :: 50 : 62\frac{1}{3}$  minutes, Ans.  
 1. (ART. 293, p. 280.)  $12^2 = 144$ ;  $144 \div 2 = 72$ ;  $\sqrt{72} = 8.48+$  feet, Ans.  
 2.  $30^2 = 900$ ;  $900 \div 2 = 450$ ;  $\sqrt{450} = 21.2+$  inches square, Ans.  
 3.  $1.5 \times 1.5 = 2.25$ ;  $2.25 \div 2 = 1.1250$ ;  $\sqrt{1.1250} = 1.06+$  inches, Ans.

### EXTRACTION OF THE CUBE ROOT.

(ART. 295, p. 284.)

(2.)	(3.)
74088(42	185193(57
64	125
$4^2 \times 300 = 4800$ 10088	$5^2 \times 300 = 7500$ 60193
4800 $\times 2 = 9600$	7500 $\times 7 = 52500$
$2^2 \times 30 \times 4 = 480$	$7^2 \times 30 \times 5 = 7350$
$2 \times 2 \times 2 = 8$	$7 \times 7 \times 7 = 343$
10088	60193

(4.)

80621568(432

64

$$4^3 \times 300 = 4800 \underline{16621}$$

$$4800 \times 3 = 14400$$

$$3^3 \times 30 \times 4 = 1080$$

$$3 \times 3 \times 3 = \underline{27}$$

15507

$$43^3 \times 300 = 554700 \underline{1114568}$$

$$554700 \times 2 = 1109400$$

$$2^3 \times 30 \times 43 = 5160$$

$$2 \times 2 \times 2 = \underline{8}$$

1114568

(5.)

176558481(561

125

$$5^3 \times 300 = 7500 \underline{51558}$$

$$7500 \times 6 = 45000$$

$$6^3 \times 30 \times 5 = 5400$$

$$6 \times 6 \times 6 = \underline{216}$$

50616

$$56^3 \times 300 = 940800 \underline{942481}$$

$$940800 \times 1 = 940800$$

$$1^3 \times 30 \times 56 = 1680$$

$$1 \times 1 \times 1 = \underline{1}$$

942481

(6.)

257259456(636

216

$$6^3 \times 300 = 10800 \underline{41259}$$

$$10800 \times 3 = 32400$$

$$3^3 \times 30 \times 6 = 1620$$

$$3 \times 3 \times 3 = \underline{27}$$

34047

$$63^3 \times 300 = 1190700 \underline{7212456}$$

$$1190700 \times 6 = 7144200$$

$$6^3 \times 30 \times 63 = 68040$$

$$6 \times 6 \times 6 = \underline{216}$$

7212456

(7.)

1860867(123

1

$$1^3 \times 300 = 300 \underline{860}$$

$$300 \times 2 = 600$$

$$2^3 \times 30 \times 1 = 120$$

$$2 \times 2 \times 2 = \underline{8}$$

728

$$12^3 \times 300 = 43200 \underline{132867}$$

$$43200 \times 3 = 129600$$

$$3^3 \times 30 \times 12 = 3240$$

$$3 \times 3 \times 3 = \underline{27}$$

132867



(8.)

1879080904(1234

1

$$1^3 \times 300 = 300 \underline{879}$$

$$300 \times 2 = 600$$

$$2^3 \times 30 \times 1 = 120$$

$$2 \times 2 \times 2 = \underline{8}$$

728

$$12^3 \times 300 = 43200 \underline{151080}$$

$$43200 \times 3 = 129600$$

$$3^3 \times 30 \times 12 = \underline{3240}$$

$$3 \times 3 \times 3 = \underline{27}$$

132867

$$123^3 \times 300 = 4538700 \underline{18213904}$$

$$4538700 \times 4 = 18154800$$

$$4^3 \times 30 \times 123 = \underline{59040}$$

$$4 \times 4 \times 4 = \underline{64}$$

18213904

(9.)

41673648.563(346.7

27

$$3^3 \times 300 = 2700 \underline{14673}$$

$$2700 \times 4 = 10800$$

$$4^3 \times 30 \times 3 = \underline{1440}$$

$$4 \times 4 \times 4 = \underline{64}$$

12304

$$34^3 \times 300 = 346800 \underline{2369648}$$

(Carried forward.)

(Brought forward.)

$$34^3 \times 300 = 346800) \underline{2369648}$$

$$346800 \times 6 = 2080800$$

$$6^3 \times 30 \times 34 = 36720$$

$$6 \times 6 \times 6 = 216$$

$$\underline{2117736}$$

$$346^3 \times 300 = 35914800) \underline{251912563}$$

$$35914800 \times 7 = 251403600$$

$$7^3 \times 30 \times 346 = 508620$$

$$7 \times 7 \times 7 = 343$$

$$\underline{251912563}$$

(10.)

$$483921.516051(78.51$$

$$\underline{843}$$

$$7^3 \times 300 = 14700) \underline{140921}$$

$$14700 \times 8 = 117600$$

$$8^3 \times 30 \times 7 = 13440$$

$$8 \times 8 \times 8 = 512$$

$$\underline{131552}$$

$$78^3 \times 300 = 1825200) \underline{9369516}$$

$$1825200 \times 5 = 9126000$$

$$5^3 \times 30 \times 78 = 58500$$

$$5 \times 5 \times 5 = 125$$

$$\underline{9184625}$$

$$785^3 \times 300 = 184867500) \underline{184891051}$$

$$184867500 \times 1 = 184867500$$

$$1^3 \times 30 \times 785 = 23550$$

$$1 \times 1 \times 1 = 1$$

$$\underline{184891051}$$

(11.)

$$\begin{array}{r} 8.144865728(2.012 \\ 8 \end{array}$$

$$20^3 \times 300 = 120000) \underline{144865}$$

$$\begin{array}{r} 120000 \times 1 = 120000 \\ 1^3 \times 30 \times 20 = 600 \\ 1 \times 1 \times 1 = 1 \\ \hline 120601 \end{array}$$

$$201^3 \times 300 = 12120300) \underline{24264728}$$

$$\begin{array}{r} 12120300 \times 2 = 24240600 \\ 2^3 \times 30 \times 201 = 24120 \\ 2 \times 2 \times 2 = 8 \\ \hline 24264728 \end{array}$$

(12.)

$$\begin{array}{r} .075686967(.423 \\ 64 \end{array}$$

$$4^3 \times 300 = 4800) \underline{11688}$$

$$\begin{array}{r} 4800 \times 2 = 9600 \\ 2^3 \times 30 \times 4 = 480 \\ 2 \times 2 \times 2 = 8 \\ \hline 10088 \end{array}$$

$$42^3 \times 300 = 529200) \underline{1598967}$$

$$\begin{array}{r} 529200 \times 3 = 1587600 \\ 3^3 \times 30 \times 42 = 11340 \\ 3 \times 3 \times 3 = 27 \\ \hline 1598967 \end{array}$$

(ART. 296, p. 285.)

(1.)

$$81_{11} = \frac{81.4545454}{64} (4.334 +$$

$$4^2 \times 300 = 4800 \overline{17454}$$

$$4800 \times 3 = 14400$$

$$3^2 \times 30 \times 4 = 1080$$

$$3 \times 3 \times 3 = 27$$

$$\overline{15507}$$

$$43^2 \times 300 = 554700 \overline{1947545}$$

$$554700 \times 3 = 1664100$$

$$3^2 \times 30 \times 43 = 11610$$

$$3 \times 3 \times 3 = 27$$

$$\overline{1675737}$$

$$433^2 \times 300 = 56246700 \overline{271808454}$$

$$56246700 \times 4 = 224986800$$

$$4^2 \times 30 \times 433 = 255840$$

$$4 \times 4 \times 4 = 64$$

$$\overline{225242704}$$

$$46565750$$

(2.)

$$\sqrt[3]{729} = \frac{9}{18} \text{ Ans.}$$

$$729(9$$

$$\overline{729}$$

$$4096(16$$

$$\overline{1}$$

$$1^2 \times 300 = 300 \overline{3096}$$

$$300 \times 6 = 1800$$

$$6^2 \times 30 \times 1 = 1080$$

$$6 \times 6 \times 6 = 216$$

$$\overline{3096}$$

$$11^*$$

(3.)

$$49_{27} = \frac{1331}{27};$$

$$\sqrt[3]{1331} = \frac{11}{18} = 3\frac{1}{3} \text{ Ans.}$$

$$1331(11$$

$$\overline{1}$$

$$1^2 \times 300 = 300 \overline{331}$$

$$300 \times 1 = 300$$

$$1^2 \times 30 \times 1 = 30$$

$$1 \times 1 \times 1 = 1$$

$$\overline{331}$$

$$27(3$$

$$\overline{27}$$

(4.)

$$166\frac{2}{3} = 133\frac{1}{3};$$

$$\sqrt[3]{133\frac{1}{3}} = 5\frac{1}{2} = 5\frac{1}{2} \text{ Ans.}$$

$$\begin{array}{r} 1331 \overline{) 11} \end{array}$$

$$\begin{array}{r} 1 \phantom{00} \overline{) 8} \end{array}$$

$$1^3 \times 300 = 300 \overline{) 331}$$

$$300 \times 1 = 300$$

$$1^3 \times 30 \times 1 = 30$$

$$1 \times 1 \times 1 = 1$$

$$\underline{331}$$

(5.)

$$85\frac{22}{5} = 1064\frac{2}{5};$$

$$\sqrt[3]{1064\frac{2}{5}} = 22 = 4\frac{2}{5} \text{ Ans.}$$

$$\begin{array}{r} 10648 \overline{) 22} \end{array}$$

$$\begin{array}{r} 8 \phantom{00} \overline{) 2648} \end{array}$$

$$2^3 \times 300 = 1200 \overline{) 2648}$$

$$1200 \times 2 = 2400$$

$$2^3 \times 30 \times 2 = 240 \quad 125(5)$$

$$2 \times 2 \times 2 = 8 \quad 125$$

$$\underline{2648}$$

1. (ART. 297, p. 285.)  $\sqrt[3]{2744} = 14$  feet, Ans.
2.  $268\frac{1}{2} \times 8 = 2150\frac{1}{2}$  cubic inches in 1 bushel;  $2150\frac{1}{2} \times 400 = 860160$  cubic inches  $= 497\frac{1}{2}$  cubic feet in 400 bushels;  $\sqrt[3]{497.777+\text{ft.}} = 7.92+\text{ft.}$  Ans.
3.  $18 \times 15 \times 10 = 2700\text{ft.}$ ;  $\sqrt[3]{2700\text{ft.}} = 13.92+\text{ft.}$  Ans.
2. (ART. 302, p. 286.)  $2^3 = 8 : 12^3 = 1728 :: \$ 6.25 : \$ 1850$  Ans.
3.  $4^3 = 64 : 6^3 = 216 :: 50 : 168.7+\text{lb.}$  Ans.
4.  $16 : 8 :: 12^3 = 1728 : 864$ ;  $\sqrt[3]{864} = 9.5+$ ;  $12 - 9.5+ = 2.5+\text{in.}$  Ans.
5.  $6^3 = 216 : 7^3 = 343 :: 800 : 1270.3+\text{lb.}$  Ans.
6.  $1^3 : 2^3 = 8 :: 1 : 8$  cords, Ans.
7.  $30^3 = 27000 : 40^3 = 64000 :: 1000 : 2370.3+\text{lb.}$  Ans.
8.  $6^3 = 216 : 12^3 = 1728 :: 16 : 128$  ounces, Ans.
9.  $15^3 = 3375$ ;  $3375 \times \frac{2}{3} = 2250$ ;  $\sqrt[3]{2250} = 13.1+$  feet. Ans.

### ARITHMETICAL PROGRESSION.

2. (ART. 304, p. 288.)  $\frac{55 - 7}{17 - 1} = 3$  Ans.
3.  $\frac{14 - 4}{15 - 1} = \frac{10}{14} = \frac{5}{7}$  Ans. | 4.  $\frac{17 - 9}{10 - 1} = \frac{8}{9}$  miles, Ans.

2. (ART. 305, p. 289.)  $\$51 + \$7 \times 6 = \$348$  Ans.

3.  $\frac{198 \times 99}{2} = 9801$  rods, Ans.

2. (ART. 306, p. 290.)  $\frac{47-8}{3} + 1 = 14$  days, Ans.

(ART. 307, p. 291.)

2.  $\frac{137-12}{5} + 1 = 26$ ;  $\frac{137+12 \times 26}{2} = 1937$  lines, Ans.

2. (ART. 308, p. 292.)  $12-1 \times 2 + 7 = 29$  miles, Ans.

3.  $10-1 \times 1\frac{1}{2} = 13\frac{1}{2}$ ;  $20\frac{1}{4} - 13\frac{1}{2} = 6\frac{1}{4}$  miles, Ans.

2. (ART. 310, p. 293.)  $(6-1) \times \$15 + \$250 = \$325$ ;  
 $250 + 325 \times 3 = \$1725$  Ans.

3.  $(10-1) \times \$19 + \$380 = \$551$ ;  $551 + 380 \times 5 =$   
 $\$4655$  Ans.

4.  $(8-1) \times \$49.50 + \$825 = \$1171.50$ ;  $1171.50 + 825$   
 $\times 4 = \$7986$  Ans.

5.  $\$100 \times .08 \times 2\frac{1}{2} = \$20$ ;  $\$100 \times .08 \times 2 = \$16$ ;

$\$100 \times .08 \times 1\frac{1}{2} = \$12$ ;  $\$100 \times .08 = \$8$ ;

$\$100 \times .04 = \$4$ ;  $\$200 \times 3 = \$600$ ;

$\$600 + \$20 + \$16 + \$12 + \$8 + \$4 = \$660$  Ans.

6.  $(8-1) \times \$42 + \$700 = \$994$ ;  $994 + 700 \times 4 =$   
 $\$6776$ ;  $\$6776 - \$100 = \$6676$  Ans.

7.  $(12-1) \times \$0.50 + \$50 = \$55.50$ ;  $55.50 + 50 \times 6 =$   
 $\$633$  Ans.

### GEOMETRICAL PROGRESSION.

2. (ART. 312, p. 295.)  $5^6 = 15625$ ;  $15625 \times 4 = 62500$  Ans.

3.  $4^6 = 4096$ ;  $4096 \times 28672 = \frac{28672}{4096} = 7$  Ans.

4.  $4^7 = 16384$ ;  $16384 \times 5 = 81920$  Ans.

5.  $20^4 = 160000$ ;  $160000 \times 10 = 1600000$  Ans.

6.  $1.06^5 = 1.3382255776$ ;  $1.3382255776 \times 30 = 40.146767828$   
 Ans.

7.  $1.06^2 = 1.3382255776$ ;  $1.3382255776 \times \$ 1728 = \$ 2312.453798 + \text{Ans.}$
8.  $1.05^4 = 1.21550625$ ;  $1.21550625 \times \$ 328.90 = \$ 399.78 + \text{Ans.}$
9.  $3^{14} = 4782969$ ;  $4782969 \times \$ 0.05 = \$ 239148.45 \text{ Ans.}$
3. (ART. 313, p. 297.)  $\frac{4^7 - 1}{4 - 1} \times 8 = 43688 \text{ Ans.}$
4.  $\frac{1 - \frac{1}{2^{35}}}{1 - \frac{1}{2}} \times 10 = \frac{10}{\frac{1}{2}} = 20 \text{ Ans.}$
5.  $\frac{1.06^4 - 1}{1.06 - 1} \times 18 = 78.743 + \text{Ans.}$
6.  $\frac{1.05^5 - 1}{1.05 - 1} \times \$ 144 = \$ 795.6909 \text{ Ans.}$
7.  $1\frac{1}{2} = \frac{3}{2}$ ;  $\frac{\frac{3}{2}^6 - 1}{\frac{3}{2} - 1} = \frac{729}{1} = 729 \text{ Ans.}$
8.  $\frac{6^4 - 1}{6 - 1} \times 2 = 518 \text{ Ans.}$
9.  $\frac{4^{10} - 1}{4 - 1} \times \$ 0.01 = \$ 3495.25 \text{ Ans.}$
2. (ART. 315, p. 299.)  $\frac{1.05^4 - 1}{1.05 - 1} \times \$ 1728 = 7447.89,6 + \text{Ans}$
3.  $\frac{1.06^7 - 1}{1.06 - 1} \times \$ 87 = \$ 730.26,3 + \text{Ans.}$
4.  $\frac{1.06^6 - 1}{1.06 - 1} \times \$ 500 = \$ 3487.65,9 + \text{Ans.}$
5.  $\frac{1.06^{10} - 1}{1.06 - 1} \times \$ 96 = \$ 1265.35,6 + \text{Ans.}$
6.  $\frac{1.06^3 - 1}{1.06 - 1} \times \$ 1000 = \$ 3183.60 \text{ Ans.}$
7.  $\frac{1.06^3 - 1}{1.06 - 1} \times \$ 56 = \$ 470.05,4 + \text{Ans.}$
8.  $\frac{1.05^7 - 1}{1.05 - 1} \times \$ 25 = \$ 203.55$ ;  $\frac{1.06^{10} - 1}{1.06 - 1} \times \$ 20 =$

\$ 263.61,5+; \$ 263.61,5 - \$ 203.55 = \$ 60.06,5+,  
William receives more than Samuel, Ans.

$$9. \frac{1.05^4 - 1}{1.05 - 1} \times \$ 10 = \$ 195.98,6+ \text{ Ans.}$$

## ALLIGATION.

(2.)

(ART. 318, p. 300.)

(3.)

$$\$ 0.20 \times 30 = \$ 6.00$$

$$\$ 0.40 \times 4 = \$ 1.60$$

$$\$ 0.25 \times 40 = \$ 10.00$$

$$\$ 0.85 \times 8 = \$ 6.80$$

$$\$ 0.30 \times 70 = \$ 21.00$$

$$\$ 1.00 \times 12 = \$ 12.00$$

$$\$ 0.40 \times 80 = \$ 32.00$$

$$\$ 1.50 \times 10 = \$ 15.00$$

$$220 \text{ gal. } \$ 69.00$$

$$34 \text{ bu. } \$ 35.40$$

$$\$ 69 \div 220 = \$ 0.31,4 \text{ Ans.} \quad \$ 35.40 \div 34 = \$ 1.04,27 \text{ Ans.}$$

(ART. 320, p. 303.)

(3.)

$$42 \left\{ \begin{array}{l} 25 \\ 30 \\ 40 \\ 50 \end{array} \right\} \begin{array}{l} 8 \\ 8 \\ 8 \\ 17 + 12 + 2 = 31 \end{array} \right\} \text{ Ans.}$$

(ART. 321, p. 303.)

(2.)

$$1.25 \left\{ \begin{array}{l} 50 \\ 60 \\ 1.50 \\ 1.70 \end{array} \right\} \begin{array}{l} 45 \\ 25 \\ 65 \\ 75 \end{array} \left\{ \begin{array}{l} 75 : 45 :: 30 : 18 \text{ bu. of oats,} \\ 75 : 25 :: 30 : 10 \text{ bu. of peas,} \\ 75 : 65 :: 30 : 26 \text{ bu. of beans,} \end{array} \right\} \text{ Ans.}$$

(3.)

$$.10 \times 1.25 = .12\frac{1}{2}$$

$$.12 \times 1.25 = .15$$

$$.15 \times 1.25 = .18\frac{3}{4}$$

$$14 \left\{ \begin{array}{l} 12\frac{1}{2} \\ 15 \\ 18\frac{3}{4} \end{array} \right\} \begin{array}{l} 1 + 4\frac{3}{4} = 5\frac{3}{4} \\ 1\frac{1}{2} \\ 1\frac{1}{2} \end{array} \left\{ \begin{array}{l} 1\frac{1}{2} : 5\frac{3}{4} :: 100 : 383\frac{1}{2} \text{ lb.} \\ 1\frac{1}{2} : 1\frac{1}{2} :: 100 : 100 \text{ lb.} \end{array} \right\} \text{ Ans.}$$



(ART. 322, p. 304.)

(2.)

$$1.80 \left\{ \begin{array}{l} 0.00 \\ 2.00 \\ 2.50 \end{array} \right. \begin{array}{l} .70 + .20 = .90 \\ 1.80 \\ 1.80 \\ \hline 4.50 \end{array}$$

$$\begin{array}{l} 4.50 : .90 :: 100 : 20 \text{ bushels of chaff,} \\ 4.50 : 1.80 :: 100 : 40 \text{ bushels of wheat,} \\ 4.50 : 1.80 :: 100 : 40 \text{ bushels of rye,} \end{array} \left. \vphantom{\begin{array}{l} 4.50 : .90 \\ 4.50 : 1.80 \\ 4.50 : 1.80 \end{array}} \right\} \text{Ans.}$$

(3.)

$$\begin{array}{l} .20 \times 1.10 = .22 \\ .30 \times 1.10 = .33 \end{array} 25 \left\{ \begin{array}{l} 22 \\ 33 \end{array} \right. \begin{array}{l} 8 \\ 8 \end{array} \begin{array}{l} 11 : 8 :: 80 : 58 \frac{2}{11} \text{ gal.} \\ 11 : 8 :: 80 : 21 \frac{8}{11} \text{ gal.} \end{array} \left. \vphantom{\begin{array}{l} 22 \\ 33 \end{array}} \right\} \text{Ans.}$$

(4.)

$$12 \left\{ \begin{array}{l} 10 \\ 15 \end{array} \right. \begin{array}{l} 3 \\ 2 \end{array} \begin{array}{l} 5 : 3 :: 60 : 36 \text{ lb.} \\ 5 : 2 :: 60 : 24 \text{ lb.} \end{array} \left. \vphantom{\begin{array}{l} 10 \\ 15 \end{array}} \right\} \text{Ans.}$$

## PERMUTATION.

2. (ART. 324, p. 305.)  $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9 = 362880 \text{ days} = 994 \text{ years, } 70 \text{ days, Ans.}$
3.  $12 \times 11 \times 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 479001600$ ; 1 to 479001600 Ans.
4.  $7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 5040 \text{ words, Ans.}$

## MENSURATION OF SURFACES.

1. (ART. 328, p. 307.)  $18 \div 2 = 9$ ;  $24 \times 9 = 216 \text{ ft. Ans.}$
2.  $50 + 60 + 70 = 180$ ;  $180 \div 2 = 90$ ;  $90 - 50 = 40$ ;  $90 - 60 = 30$ ;  $90 - 70 = 20$ ;  $90 \times 40 \times 30 \times 20 = 2160000$ ;  $\sqrt{2160000} = 1469.69 + \text{ rods, Ans.}$

- 1 (ART. 331, p. 308.)  $25 \times 3 = 75$  feet, Ans.
2.  $37 \times 27 = 999$  feet;  $40 \times 20 = 800$  feet;  $999 - 800 = 199$  feet, Ans.
3.  $15 \times 12 = 180$  feet, Ans.
1. (ART. 333, p. 309.)  $482 + 324 = 806$  ft.;  $806 \div 2 = 403$ ;  $403 \times 216 = 87048$  square feet, Ans.
2.  $28 + 20 = 48$  in.;  $48 \div 2 = 24$  in. = 2 ft.;  $2 \times 22 = 44$  square feet, Ans.
1. (ART. 335, p. 309.)  $65 \times \frac{1}{2}^4 = 455$ ;  $65 \times \frac{1}{2}^3 = 585$ ;  $455 + 585 = 1040$  square feet, Ans.
2.  $125 \times \frac{1}{2}^2 = 4375$ ;  $125 \times \frac{3}{2}^2 = 5312.5$ ;  $4375 + 5312.5 = 9687.5$  square rods, Ans.
1. (ART. 338, p. 310.)  $35 \times 5 = 175$ ;  $175 \times \frac{24.08}{2} = 2107$  square feet, Ans.
2.  $20 \times 6 = 120$ ;  $120 \times \frac{17.32}{2} = 1039.20$  square feet, Ans.
1. (ART. 340, p. 310.)  $3.141592 \times 50 = 157.0796 +$  ft. Ans.
2.  $3.141592 \times 100 = 314.15 +$  rods, Ans.
1. (ART. 341, p. 310.)  $.318309 \times 80 = 25.46 +$  miles, Ans.
2.  $.318309 \times 62.84 = 20 +$  feet, Ans.
1. (ART. 342, p. 311.)  $200 \times 200 \times .785398 = 31415.92$  sq. feet, Ans.
2.  $400 \times 400 \times .079577 = 12732 +$  p. = 79A. 2R. 12 + p. Ans.
1. (ART. 343, p. 311.)  $40 \times .886227 = 35.44 +$  rods, Ans.
2.  $100 \times .282094 = 28.2 +$  rods, Ans.
1. (ART. 344, p. 312.)  $30 \times .707106 = 21.21 +$  inches, Ans.
2.  $100 \times .225079 = 22.5 +$  rods square, Ans.
1. (ART. 346, p. 312.)  $14 \times 10 \times .785398 = 109.95 +$  square inches, Ans.
2.  $8 \times 5 \times .785398 = 31.415 +$  ft. = 31 square feet, 59 + sq. inches, Ans.

## MENSURATION OF SOLIDS.

1. (ART. 349, p. 313.)  $3 \times 3 = 9$ ;  $9 \times 15 = 135$ ;  $3 + 3 + 3 = 9 \div 2 = 4.5$ ;  $4.5 - 3 = 1.5$ ;  $1.5 \times 1.5 \times 1.5 \times 4.5 = 15.1975$ ;  $\sqrt{15.1975} = 3.895+$ ;  $3.895 \times 2 = 7.79+$ ;  $135 + 7.79+ = 142.79+$  square feet, Ans.

2.  $9 \times 4 = 36$ ;  $36 \times 25 = 900$ ;  $9 \times 9 = 81$ ;  $81 \times 2 = 162$ ;  $900 + 162 = 1062$  square feet, Ans.

1. (ART. 350, p. 314.)  $5 + 4 + 3 = 12$ ;  $12 \div 2 = 6$ ;  $6 - 5 = 1$ ;  $6 - 4 = 2$ ;  $6 - 3 = 3$ ;  $1 \times 2 \times 3 \times 6 = 36$ ;  $\sqrt{36} = 6$ ;  $20 \times 6 = 120$  cubic feet, Ans.

2.  $8 \times 8 \times 8 = 512$  cubic feet, Ans.

3.  $30 \times 20 \times 10 = 6000$  cubic feet, Ans.

1. (ART. 352, p. 314.)  $3 \times 4 = 12$ ;  $3 \times 3 \times .079577 = .716+$ ;  $.716 \times 2 = 1.43+$ ;  $12 + 1.43+ = 13.43+$  square feet, Ans.

2.  $2 \times 3.141592 = 6.283184$ ;  $6.283184 \times 12 = 75.39+$  sq. feet, Ans.

1. (ART. 353, p. 314.)  $2 \times 2 \times .785398 = 3.141592$ ;  $3.141592 \times 8 = 25.13+$  cubic feet, Ans.

2.  $5 \times 5 \times .785398 = 19.63495$ ;  $19.63495 \times 20 = 392.69+$  feet, Ans.

1. (ART. 356, p. 315.)  $100\text{ft.} = 1200\text{in.}$ ;  $54\text{ft.} = 648\text{in.}$ ;  $1200 \div 2 = 600$ ;  $648 \times 600 = 388800$ ;  $388800 \div 27 = 14400\text{in.} = 400$  yards, Ans.

2.  $50 \div 2 = 25$ ;  $25 \times 12 = 300$  square feet, Ans.

1. (ART. 357, p. 315.)  $693 \times 693 = 480249$ ;  $480249 \times 500 = 240124500$ ;  $240124500 \div 3 = 80,041,500$  cubic feet;  $80,041,500 \div 8 = 10,005,187.5$  feet;  $10,005,187.5 \div 5280 = 1894.9$  miles, Ans.

2.  $5 \times 5 \times .785398 = 19.6349$ ;  $19.6349 \times 30 = 589.04$ ;  $589.04 \div 3 = 196.3+$  feet, Ans.

1. (ART. 360, p. 316.)  $8 \times 4 = 32$ ;  $4 \times 4 = 16$ ;  $32 + 16 = 48$ ;  $48 \times 20 = 960$ ;  $960 \div 2 = 480$ ;  $8 \times 8 = 64$ ;  $4 \times 4 = 16$ ;  $64 + 16 = 80$ ;  $480 + 80 = 560$  square feet, Ans.

2.  $18 + 9 = 27$ ;  $27 \times 12 = 324$ ;  $324 \div 2 = 162$ ;  $18 \times 18 \times .079577 = 25.78 +$ ;  $9 \times 9 \times .079577 = 6.44 +$ ;  $25.78 + 6.44 = 32.22 +$ ;  $162 + 32.22 + = 194.22 +$  square feet, Ans.

1. (ART. 361, p. 316.)  $20 \times 20 = 400$ ;  $10 \times 10 = 100$ ;  $400 \times 100 = 40000$ ;  $\sqrt{40000} = 200$ ;  $200 + 400 + 100 = 700$ ;  $700 \times 30 = 21000$ ;  $21000 \div 3 = 7000$  cubic feet, Ans.

2.  $12 \times 12 \times .785398 = 113.097 +$ ;  $6 \times 6 \times .785398 = 28.274$ ;  $113.097 \times 28.274 = 3197.704578$ ;  $\sqrt{3197.704578} = 56.548 +$ ;  $56.548 + 113.097 + 28.274 = 197.919 + \text{in.}$   $= 1.3744 + \text{ft.}$ ;  $1.3744 + \times 20 = 27.488 +$ ;  $27.488 + \div 3 = 9.162 +$  feet, Ans.

1. (ART. 363, p. 317.)  $3.141592 \times 20 = 62.83 +$ ;  $62.83 + \times 20 = 1256.6 +$  square inches, Ans.

2.  $3.141592 \times 8000 = 25132.736$ ;  $25132.736 \times 8000 = 201061888$  square miles, Ans.

1. (ART. 364, p. 317.)  $20 \times 20 \times 20 \times .523598 = 4188.7 +$  inches, Ans.

2.  $5 \times 5 \times 5 \times .523598 = 65.44 +$  cubic feet, Ans.

1. (ART. 365, p. 317.)  $10 \times 10 = 100$ ;  $100 \div 3 = 33.33 +$ ;  $\sqrt{33.33 +} = 5.773 +$  inches, Ans.

2.  $30 \times 30 = 900$ ;  $900 \div 3 = 300$ ;  $\sqrt{300} = 17.32 +$  feet, Ans.

1. (ART. 367, p. 318.)  $20 \times 20 \times 30 \times .523598 = 6283.17 +$  cubic feet, Ans.

2.  $30 \times 30 \times 10 \times .523598 = 4712.38 +$  cubic feet, Ans.

## MENSURATION OF LUMBER AND TIMBER.

1. (ART. 369, p. 318.)  $16 \times 18 = 288\text{in.}$ ;  $288\text{in.} \div 12 = 24$  feet, Ans.
2.  $24 \times 30 = 720\text{in.}$ ;  $720\text{in.} \div 12 = 60\text{ft.}$  Ans.
1. (ART. 370, p. 318.)  $4 \times 3 \times 12 = 144\text{in.}$ ;  $144\text{in.} \div 12 = 12$  feet, Ans.
2.  $10 \times 10 \times 25 = 2500\text{in.}$ ;  $2500 \div 12 = 208\frac{1}{3}$  feet, Ans.
1. (ART. 371, p. 319.)  $60 \div 4 = 15$ ;  $15 \times 15 = 225$ ;  $225 \times 50 = 11250$ ;  $11250 \div 144 = 78\frac{1}{2}$  cubic feet, Ans.
2.  $30 \div 4 = 7.5$ ;  $7.5 \times 7.5 \times 30 = 1687.50$ ;  $1687.50 \div 144 = 11.7 +$  solid feet, Ans.

## MISCELLANEOUS EXAMPLES.

(PAGE 319.)

1.  $7\frac{1}{2} = 7\frac{1}{2}$ ;  $7\frac{1}{2} - \frac{1}{8} = 7\frac{3}{8}$  Ans.
  2.  $4\frac{1}{4} = 4\frac{2}{8}$ ;  $3\frac{2}{3} = 3\frac{2}{3}$ ;  $4\frac{2}{8} + 3\frac{2}{3} = 7\frac{1}{2}\frac{2}{3}$  Ans.
  3.  $5\frac{2}{3} \times 5 = 27\frac{1}{3}$ ;  $27\frac{1}{3} - 3\frac{2}{3} = 23\frac{1}{3}$  Ans.
  4.  $\frac{7}{11}\text{m.} = \frac{7}{11} \times \frac{8}{1} = \frac{56}{11} = 5\frac{1}{11}\text{fur.}$ ;  $\frac{1}{11}\text{fur.} = \frac{1}{11} \times \frac{40}{1} = \frac{40}{11}\text{rd.}$ ;  $\frac{7}{11}\text{rd.} = \frac{7}{11} \times \frac{32}{1} = \frac{224}{11} = 20\frac{4}{11}\text{ft.}$ ;  $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4} = 6\text{in.}$ ;  $\frac{7}{8}\text{fur.} = \frac{7}{8} \times \frac{40}{1} = \frac{280}{8} = 35\text{rd.}$ ;  $\frac{1}{8} \times \frac{32}{1} = \frac{32}{8} = 4\text{ft.}$ ;  $\frac{1}{8}\text{ft.} = \frac{1}{8} \times \frac{12}{1} = \frac{12}{8} = 1\frac{1}{2}\text{in.}$
- |      |     |     |        |
|------|-----|-----|--------|
| fur. | rd. | ft. | in.    |
| 5    | 3   | 10  | 6      |
|      | 31  | 1   | 10     |
| 4    | 12  | 8   | 8 Ans. |
5.  $7 : 12 :: \frac{3}{8} : \frac{33}{8} = 3\frac{3}{8}\text{h.}$ , time Swift will travel the distance;  
 $5 : 12 :: \frac{7}{11} : \frac{24}{11}\text{h.}$ , time Slow will travel the distance;  
 $\frac{33}{8} - \frac{24}{11} = \frac{4}{11}\text{h.}$ ;  $\frac{4}{11} \times \frac{60}{1} \times \frac{60}{1} = \frac{14400}{11} = 1236$  seconds, Ans.

6.  $\frac{3}{4}T. = \frac{3}{4} \times 2^a = 1\frac{1}{2}^a \text{ cwt.}; 1\frac{1}{2}^a \text{ cwt.} : \frac{1}{4} \text{ cwt.} :: \$49 : \frac{3}{100} \times \frac{1}{4} \times \frac{4}{1} = \$3.92 \text{ Ans.}$
7.  $8 \times 4 \times 2 = 64; 1728 \div 64 = 27$ , number of bricks in a cubic foot;  $40 \times 20 \times 2 = 1600$  cubic feet in the wall;  $1600 \times 27 = 43200$  bricks, Ans.
8.  $80 + 40 = 120; 120 \times 2 = 240$  feet round the house; from this sum we deduct 4 feet for the corners;  $240 - 4 = 236; 236 \times 25 \times 27 = 159300$  bricks, Ans.
9.  $18 \times 12 \times 144 = 31104$ , number of square inches in the floor;  $8 \times 8 = 64$  square inches in a tile;  $31104 \div 64 = 486$  tiles, Ans.
10.  $11 \text{ cwt. } 3 \text{ qr. } 19 \text{ lb.} = 1194 \text{ lb.}; 83 \text{ cwt. } 2 \text{ qr. } 11 \text{ lb.} = 8361 \text{ lb.}$   
 $1194 \text{ lb.} : 8361 \text{ lb.} :: \$18.25 : \$266.70 + \text{Ans.}$   
 $46 \text{ m.} : 96 \text{ m.}$
11.  $1.00 - .25 = .75; \$24 : \$34 :: .75 \quad 1.06\frac{1}{4}; 1.06\frac{1}{4} - 1.00 = .06\frac{1}{4} = 6\frac{1}{4} \text{ per cent. Ans.}$
12.  $120 - 20 = 100$  gallons remaining;  $\$30 + \$10 = \$40$ , price to be obtained;  $100 \text{ gals.} : 1 \text{ gal.} : \$40 : \$0.40 \text{ Ans.}$
13.  $\$128.25 \times 1.03 = \$132.0975; \$132.0975 \times 1.06 = \$140.02 + \text{Ans.}$
14.  $\frac{1}{3} \text{ of } 24 \text{ h.} = 8 \text{ h.}; \frac{1}{4} \text{ of } 24 \text{ h.} = 6 \text{ h.}; 8 + 6 + 2 + 6 = 22 \text{ h.}; 24 \text{ h.} - 22 \text{ h.} = 2 \text{ hours, Ans.}$
15.  $\frac{1}{4} \text{ of } 24. = 6 \text{ h.}; \frac{1}{5} \text{ of } 24 \text{ h.} = 4\frac{4}{5} \text{ h.}; \frac{1}{8} \text{ of } 24 \text{ h.} = 3 \text{ h.}; \frac{1}{10} \text{ of } 24 \text{ h.} = 2\frac{4}{5} \text{ h.}; 6 + 4\frac{4}{5} + 3 + 2\frac{4}{5} = 20\frac{8}{5} \text{ h.}; 24 \text{ h.} - 20\frac{8}{5} \text{ h.} = 3\frac{2}{5} \text{ hours, Ans.}$

(16.)

$$5\frac{3}{4} \text{ E.E.} : 71\frac{1}{2} \text{ yd.} :: \$15.16$$

$$\begin{array}{r} 5 \qquad 4 \\ \hline 28 \quad : \quad 287 \end{array}$$

$$28 : 287 :: 15.16 : \$155.39 \text{ Ans.}$$

17.  $5\frac{3}{4} \text{ ft.} : 4 \text{ ft.} :: 150 \text{ ft.} : 107\frac{1}{4} \text{ feet, Ans.}$
18.  $\$100 : \$150 :: 6 \text{ m.} : 9 \text{ m. Ans.}$
19.  $\$1.20 \times 150 = \$180.00$ , sum paid by the polls;  $\$6045.50 - \$180.00 = \$5865.50$  to be paid on valuation;

- \$ 293275 : \$ 5865.50 :: \$ 1.00 : \$ 0.02 on a dollar  
 \$ 1.00 : \$ 0.02 :: \$ 3675 : \$ 73.50; \$ 1.20  $\times$  4 =  
 \$ 4.80; \$ 4.80 + \$ 73.50 = \$ 78.30 Ans.
20.  $23\frac{1}{2} = 19\frac{1}{2}$ ;  $16\frac{1}{2} = 3\frac{1}{2}$ ;  $19\frac{1}{2} \times 3\frac{1}{2} = 54\frac{1}{4} = 388\frac{1}{2}\text{ft.}$ ;  
 $13\frac{1}{2} = 3\frac{1}{2}$ ;  $3\frac{1}{2} \times 3\frac{1}{2} = 11\frac{1}{4} = 223\frac{1}{2}\text{ft.}$ ;  $7\frac{1}{2} \times 2 =$   
 $14\frac{1}{2}$ ;  $388\frac{1}{2} - 14\frac{1}{2} = 374\frac{1}{2} = 78\frac{1}{2}$ ;  $223\frac{1}{2} - 14\frac{1}{2} =$   
 $209\frac{1}{2} = 42\frac{1}{2}$ ;  $78\frac{1}{2} \times 42\frac{1}{2} = 3342\frac{1}{4} = 7822\frac{1}{2}$   
 square feet = 1A. 3R. 7p.  $85\frac{1}{2}\text{ft.}$  Ans.
21.  $100 \times 80 = 8000$  square feet in the garden;  $100 + 80 =$   
 180;  $180 \times 2 = 360\text{ft.}$  To this we add 4 feet for each  
 corner = 16ft.;  $360 + 16 = 376\text{ft.}$ , length of the ditch;  
 $376 \times 4 = 1504\text{ft.}$ , superficial contents of the ditch;  
 $8000 \div 1504 = 5\frac{1}{4}$  feet, depth of the ditch, Ans.
22.  $15\frac{1}{2} \times 12 = 186\text{in.}$ ;  $11\frac{1}{2} \times 12 = 135\text{in.}$ ;  $7\frac{1}{2} \times 12 =$   
 93in.;  $186 + 135 = 321$ ;  $321 \times 2 = 642$ ;  $642 \times 93$   
 = 59706 square inches;  $59706 \div 30 = 1990\frac{1}{5}$ ;  $1990\frac{1}{5}$   
 $\div 36 = 55\frac{1}{6}\text{yd.}$  Ans.
23.  $15\frac{1}{2} + 11\frac{1}{2} = 26\frac{1}{2}$ ;  $26\frac{1}{2} \times 2 = 53\frac{1}{2} = 19\frac{1}{2}$ ;  $7\frac{1}{2} = 3\frac{1}{2}$ ;  
 $19\frac{1}{2} \times 3\frac{1}{2} = 33\frac{1}{4}$ ;  $15\frac{1}{2} = 3\frac{1}{2}$ ;  $11\frac{1}{2} = 4\frac{1}{2}$ ;  $4\frac{1}{2} \times 3\frac{1}{2} =$   
 $13\frac{3}{4}$ ;  $33\frac{1}{4} + 13\frac{3}{4} = 47\frac{1}{2} = 589$  square feet;  $589 \div$   
 9 =  $65\frac{1}{3}$  square yards;  $65\frac{1}{3} \times 10 = \$ 6.54\frac{1}{3}$  Ans.

(24.)

Y.	mo.	d.	
1852	9	29	\$ 17.86
1850	1	9	.163 $\frac{1}{2}$
2	8	20	5358

10716

1786

595

2.91718

7 $\frac{1}{4}$ 

20.41991

72928

6)21.14919

Ans. \$ 3.52,476

25.  $30 \times 30 = 900$ ;  $900 \div 3 = 300$ ;  $\sqrt{300}$  = length of one  
 side of the cube;  $\sqrt{300} \times \sqrt{300} \times 6 = 1800$  inches, Ans.

(26.)

Principal bearing interest from Oct. 29, 1856,	\$ 1000.00
Compound interest on \$ 1000 from Oct. 29, 1856, to	
Oct. 29, 1862, 6 years,	418.51
Amount of principal to Oct. 29, 1862,	<u>1418.51</u>
First payment, Jan. 1, 1857,	\$ 125.00
Compound interest from Jan. 1, 1857, to	
Oct. 29, 1862, 5y. 9m. 28d.,	50.58
Second payment, June 5, 1857,	316.00
Compound interest from June 5, 1857, to	
Oct. 29, 1862, 5y. 4m. 24d.,	117.02
Third payment, Sept. 25, 1857,	417.00
Compound interest from Sept. 25, 1857, to	
Oct. 29, 1862, 5y. 1m. 4d.,	144.20
Fourth payment, April 1, 1858,	100.00
Compound interest from April 1, 1858, to	
Oct. 29, 1862, 4y. 6m. 28d.,	30.62
Fifth payment, July 5, 1858,	50.00
Compound interest from July 5, 1858, to	
Oct. 29, 1862, 4y. 3m. 24d.,	<u>14.30</u>
Amount of indorsements,	\$ <u>1364.72</u>
Balance due Oct. 29, 1862,	\$ <u>53.79</u>

$$27. 40 \times 40 = 1600; 1600 \div 3 = 533.33\frac{1}{3}; \sqrt{533.33\frac{1}{3}} = 23.09401; 533.33\frac{1}{3} \times 23.09401 = 12316.8 + \text{Ans.}$$

$$28. 32 : 4 :: 18.5^3 : 791.453125; \sqrt[3]{791.453125} = 9.25 = 9\frac{1}{4} \text{ inches wide}; 32 : 4 :: 8^3 : 64; \sqrt[3]{64} = 4 \text{ inches deep, Ans.}$$

29. As  $\frac{1}{3}$  of the estate was given to the wife,  $\frac{2}{3}$  of the estate will remain. The eldest son has  $\frac{1}{4}$  of the  $\frac{2}{3} = \frac{1}{2} = \frac{1}{4}$ . The wife and son will therefore have  $\frac{1}{3} + \frac{1}{4} = \frac{7}{12}$  of the estate. The daughter is to have  $\frac{1}{3}$  of the residue; that is,  $\frac{1}{3}$  of  $\frac{1}{2} = \frac{1}{4}$ . Therefore the wife, son, and daughter, will have  $\frac{1}{3}$ ,  $\frac{1}{4}$ , and  $\frac{1}{4}$ ; and  $\frac{1}{2} - \frac{1}{4} = \frac{1}{4}$  will remain to be divided among the other heirs. But, if  $\frac{1}{4}$ , the daughter's portion,



is \$151.33 $\frac{1}{2}$ ,  $\frac{1}{12}$ , the residue, will be 5 times as much, that is, 5 times \$151.33 $\frac{1}{2}$  = \$756.66 $\frac{3}{4}$  Ans.

OPERATION.

$$\frac{1}{12} : \frac{1}{12} :: \$151.33\frac{1}{2} : \$756.66\frac{3}{4} \text{ Ans.}$$

30. If the son receives  $\frac{1}{4}$ , there will remain  $\frac{3}{4} - \frac{1}{4} = \frac{2}{4}$ ; and  $\frac{1}{2}$  of  $\frac{2}{4} = \frac{1}{4}$  will be the daughter's portion. The son and daughter will receive  $\frac{1}{4} + \frac{1}{4} = \frac{2}{4} = \frac{1}{2}$  of the estate; there will therefore remain  $\frac{1}{2} - \frac{1}{2} = \frac{1}{2}$  for the wife; and the son will receive  $\frac{1}{4} - \frac{1}{4} = \frac{1}{4}$  more than the daughter; therefore,  $\frac{1}{4} : \frac{1}{2} :: \$100 : \$600$ , wife's portion, Ans.

31.  $1.12\frac{1}{2} : 1.00 :: \$50 : \$44.44\frac{4}{9}$  Ans.

32. \$5.00 : \$17.50 ::  $\frac{3}{4}$  yd. :  $\frac{9}{8}$  yd. Ans.

33. \$128 - \$70 = \$58; \$58 : \$70 :: \$1000 : \$1206.  
89 $\frac{4}{5}$  Ans.

34. \$1.218 $\frac{1}{2}$  : \$1.00 :: \$1000 : \$820.79 $\frac{7}{8}$  Ans.

35. \$97.57 - \$88 = \$9.57.

$$\left. \begin{array}{l} \$88 : \$100 \\ 18\text{m.} : 12\text{m.} \end{array} \right\} :: \$9.57 : \$7\frac{1}{4}$$

$$\frac{\$9.57 \times 1000 \times 12}{18 \times 88} = \frac{11484}{168} = 7\frac{1}{4} \text{ per cent. Ans.}$$

36.  $\frac{3}{8}$  gal. : 7 $\frac{1}{4}$  gal. :: \$87 =  $\frac{2}{3} : \frac{21}{4} :: \frac{21}{4} = \frac{2}{3} \times \frac{21}{4} \times \frac{21}{4} = \frac{12615}{12} = \$1051.25$  Ans.

37. 18 $\frac{3}{4}$  yd. : 5 yd. :: \$71 =  $\frac{129}{4} : \frac{5}{1} :: \frac{5}{1} = \frac{129}{4} \times \frac{5}{1} \times \frac{5}{1} = \frac{2485}{129} = \$19.26\frac{48}{129}$  Ans.

38. 18 tons 17 cwt. 3 qr. = 377 $\frac{3}{4}$  cwt.; 1 cwt. : 377 $\frac{3}{4}$  cwt. :: \$9.50 : \$3588 $\frac{3}{4}$ ; \$4.00 : \$3588 $\frac{3}{4}$  :: 1 yd. : 897 $\frac{3}{4}$  yd. Ans.

39. 1 bu. : 98 bu. :: \$0.45 : \$44.10; \$1.25 : \$44.10 :: 1 bu. : 35 $\frac{7}{5}$  bu. Ans.

40. By the question, we find  $\frac{1}{4}$  of the time passed from noon equal to  $\frac{1}{11}$  of the time to midnight. We reduce these fractions to a common denominator,  $\frac{1}{4}$  and  $\frac{1}{11} = \frac{11}{44}$  and  $\frac{1}{77}$ . When fractions are reduced to a common denominator, their value is as their numerators. Therefore 11 will represent the time

passed from noon, and 7 the time to midnight, and  $11 + 7 = 18$  will represent 12 hours; therefore  $7 : 18 :: 12h. : 4h. 40m.$  time from noon, Ans.

41.  $20000 \times 4 \times 40 \times 272\frac{1}{4} \times 144 \times 3 = 376358400000$  cubic inches;  $376358400000 \div 282 = 1334604255\frac{45}{111}$  gallons;  $1334604255\frac{45}{111} \div 100 = 13346042$  hhd. 55 gal.,  $1\frac{5}{111}$  gal. = 1 qt. Opt.  $2\frac{19}{111}$  gi. Ans.

42.  $1^\circ : 71^\circ 4' :: 4m. : 4h. 44m. 16sec.$ ;  $11h. 16m. 0sec. - 4h. 44m. 16sec. = 6h. 31m. 44sec.$  Ans.

(43.)

$$\begin{array}{r} 18^\circ \quad 24' \text{ E.} \\ 67^\circ \quad 21' \text{ W.} \end{array}$$

$$\begin{array}{r} 1^\circ : 85^\circ \quad 45' :: 4m. \\ 60 \quad 60 \\ \hline 60 \quad 5145 \\ \quad 4 \\ \hline 60)20580 \\ \quad 60)343m. \\ \quad \quad 5h. 43m. \end{array}$$

NOTE.—To perform this question, we are obliged to add 12 hours to the minuend, and it brings the time to the evening of the previous day.

$$\begin{array}{r} h. \quad m. \\ 2 \quad 36 \text{ A. M.} \\ 5 \quad 43 \\ \hline 8 \quad 53 \text{ P. M. Ans.} \end{array}$$

(44.)

$$\begin{array}{r} h. \quad m. \\ 12 \quad 0 \\ 11 \quad 36 \\ \hline 4m. : 24m. :: 1^\circ \\ \quad 1 \\ \hline 4)24(6^\circ \\ \quad 24 \\ \hline \end{array} \quad \begin{array}{r} 16^\circ \quad 18' \text{ W.} \\ 6 \quad 0 \\ \hline 10 \quad 18 \text{ W.} \end{array}$$

45.  $3000 \times 5280 = 15840000$ ;  $15840000 \div 1142 = 13870 +$  seconds;  $13870 \div 60 = 231m. 10sec.$ ;  $231 \div 60 = 3h. 51m.$ ;  $3h. 51m. 10\frac{1}{2}sec.$  Ans.

46.  $1142 \times 10 = 11420$ ;  $11420 \div 5280 = 2m. 860ft.$  Ans.

47.  $20 - 15 = 5 : 15 :: 10 : 30$  cents, Ans.

48.  $12\frac{1}{2} - 10 = 2\frac{1}{2}$ ;  $10 : 2\frac{1}{2} :: 1.00 : .25$  per cent.;  $19 - 15 = 4$ ;  $15 : 4 :: 1.00 : .26\frac{2}{3}$  per cent.;  $.26\frac{2}{3} - .25 = 1\frac{1}{3}$  per cent., which Y makes more than Q.

49. From Sept. 25 to Jan. 1 are 97 days = 139680 minutes.  
 From 23 minutes past 3 A. M. to midnight is 20h. 37m.  
 = 1237 minutes. From Jan. 1, 1787, to Jan. 1, 1844, are  
 57 years =  $365 \times 57 \times 24 \times 60 = 29959200$  minutes.  
 From Jan. 1, 1844, to July 4, 1844, are 185 days =  $185$   
 $\times 24 \times 60 = 266400$  minutes. From Jan. 1, 1787, to  
 Jan. 1, 1844, are 13 leap years; we have, therefore, to add  
 the number of minutes in 13 days;  $13 \times 24 \times 60 = 18720$   
 minutes. To these we add the minutes from 30 minutes past  
 5 A. M. to midnight = 1050 minutes.

139680

1237

29959200

266400

18720

1050

Ans. 30386287 minutes.

NOTE. — We have reckoned but 13 leap  
 years from Jan. 1, 1787, to Jan. 1, 1844,  
 because 1800 was not a leap year.

(50.)

S.	°	'	"
8	14	26	14
8	19	43	28

Ans. 6 24 42 46

NOTE. — As the moon is east of the star,  
 and is also moving eastward in her orbit,  
 we must add 12 signs to the minuend.

(51.)

A.	R.	p.	ft.
3	1	23	200
1	2	37	

We first reduce the 200 feet  
 in the minuend to yards and  
 feet;  $200 \div 9 = 22$  yd. 2ft.

A.	R.	p.	yd.	ft.	in.
3	1	23	22	2	0
1	2	37	30	8	0
1	2	25	$21\frac{1}{4}$	3	0
			$\frac{1}{4} = 2$	36	
1	2	25	21	5	36

(52.)

$$\frac{5}{8} \div \frac{3}{4} = \frac{5}{8} \times \frac{4}{3} = \frac{20}{24} \text{ Ans.}$$

(53.)

z.	s.	d.	qr.
1	19	11	3
1	19	11	3
1	19	11	3
1	17	11	3 $\frac{1}{2}$
	1	9	3 $\frac{228}{100}$
		1	1 $\frac{527}{660}$

Ans. 3 19 11 0 $\frac{1}{860}$

NOTE. — The first product is obtained by multiplying the multiplicand by 1, the second product by multiplying it by  $\frac{1}{2}$ , the third product by multiplying by  $\frac{1}{4}$ , and the fourth product by multiplying by  $\frac{3}{8}$ .

54.  $1.00 - .40 = .60$ ;  $.60 : 1.00 :: \$68.75 : \$114.58\frac{1}{2}$  Ans.

55.  $\$134.40 - \$120 = \$14.40$ ;  $\$120 : \$14.40 :: 1.00 : .12$  per cent. Ans.

56.  $\$3600 + \$4200 + \$2200 = \$10000$ ;  $\$15000 \times .15 = \$2250$ ;  $\$15000 - \$2250 = \$12750$ ;  $\$12750 - \$10000 = \$2750$ ;  $\$10000 : \$2750 :: \$36000 : \$990$ , Emerson's gain;  $\$10000 : \$2750 :: \$4200 : \$1155$ , Bailey's gain;  $\$10000 : \$2750 :: \$2200 : \$605$ , Curtis' gain.

57.  $3\frac{1}{2}$  in.  $\times 2 = 7$  in.; 4 ft. 9 in. = 57 in.; 3 ft. 7 in. = 43 in.; 2 ft. 11 in. = 35 in.;  $43 \times 2 = 86$ ;  $43 - 7 = 36$ ;  $35 - 7 = 28$ ;  $86 \times 57 = 4902$ ;  $28 \times 2 = 56$ ;  $56 \times 57 = 3192$ ;  $36 \times 28 \times 2 = 2016$ ;  $4902 + 3192 + 2016 = 10110$ ;  $10110 \div 144 = 70\frac{3}{4}$  square feet;  $57 - 7 = 50$ ;  $43 - 7 = 36$ ;  $35 - 7 = 28$ ;  $50 \times 36 \times 28 = 50400$ ;  $50400 \div 1728 = 29\frac{1}{2}$  cubic feet, Ans.

58.  $64 \times 2 = 128$  ft.;  $32 \times 2 = 64$  ft. From 64 ft. we subtract four times the thickness of the wall; 1 ft. 4 in.  $\times 4 = 5$  ft. 4 in.; 64 ft. — 5 ft. 4 in. = 58 ft. 8 in.; 128 ft. + 58 ft. 8 in. = 186 ft. 8 in. = length of the wall of the house.

ft.	in.	ft.	in.	ft.	in.
186	8	7	4	2	8
	4		3		6
746	8	22	0	13	4
	7		3 8		14
3)5226	8	66	0	15	1 4
1742	2 8	14	8		4
6968	10 8	80	8	60	5 4
	765 11 1 4				4
6202	11 6 8			241	9 4
	12			80	8
74435				252	
	12			3)574	5 4
893226				191	5 9 4
	12			765	11 1 4

64 cubic  
inches  
[in a brick.]

64)10718720(167,480 bricks, Ans.

59.  $\frac{1}{2}$  and  $\frac{1}{4} = \frac{2}{4}$  and  $\frac{3}{4}$ ;  $\frac{2}{4} + \frac{3}{4} = \frac{5}{4}$ ;  $\frac{5}{4} : \frac{1}{2} :: \$1000$   
: \$ 571.42¢, Benjamin's share;  $\frac{5}{4} : \frac{3}{4} :: \$1000$  :  
\$ 428.57¢, Samuel's share.

60. As Bailey occupied the whole house the first four months, he must pay  $\frac{1}{2}$  of \$100 = \$33 $\frac{1}{2}$ . As he occupied half of the next four months, he must pay half of \$33 $\frac{1}{2}$  = \$16 $\frac{3}{4}$ , and Bricket must pay the same sum, \$16 $\frac{3}{4}$ . For the last four months each must pay  $\frac{1}{2}$  of \$33 $\frac{1}{2}$  = \$11 $\frac{3}{4}$ . \$33 $\frac{1}{2}$  + \$16 $\frac{3}{4}$  + \$11 $\frac{3}{4}$  = \$61 $\frac{1}{2}$ , Bailey's share of rent; \$16 $\frac{3}{4}$  + \$11 $\frac{3}{4}$  = \$27 $\frac{3}{4}$ , Bricket's share; \$11 $\frac{3}{4}$  = Dana's share.

61.  $42\frac{1}{2} \times 14\frac{1}{2} \times 2 = 12168$  square inches of surface.  $3 \times 3 \times 2 = 18$  inches, the superficial contents of a side of two cubes, which measure 3 inches on each side.  $12168 \div 18 = 12150$ ;  $12150 \div 6 = 2025$ ;  $\sqrt{2025} = 45$ ;  $45 + 3 = 48$  inches, Ans.

In order to understand the rationale of the above operation, the pupil will take six square pieces of board, which are of the same size. With them

let him construct a cubical box ; and then, by examining it, he will find that he needs two small cubes, whose sides are equal to the thickness of the board or plank of which his box is constructed, in order to complete it. As our plank in the above question is three inches thick, the sides of each cube will be three inches, and the surface of one side will be  $3 \times 3 = 9$  square inches, and of the two cubes it will be  $2 \times 9 = 18$  square inches. These 18 inches, therefore, must be subtracted from the surface of the plank, thus :  $12168 - 18 = 12150$ . These remaining inches are the surface of the six square boards, and  $\frac{1}{6}$  of these will be the surface of one board, thus :  $12150 \div 6 = 2025$ . The square root, therefore, of this number, will be one side of one of the boards.  $\sqrt{2025} = 45$  inches. To this we must add the thickness of the plank or board,  $45 + 3 = 48$  inches, Ans.

62.  $\$ 1.00 - .10 = .90$  ;  $1.00 + .16 = 1.16$  ;  $1.16 - .90 = .26$  ;  $.26 : 1.00 :: \$ 21.84 : \$ 84.00$ , real value of the horse ;  $1.00 : .90 :: \$ 84.00 : \$ 75.60$ , price paid, Ans.  
 63.  $1.00 - .12 = .88$  ;  $.88 : .100 :: \$ 4.40 : \$ 5.00$  ;  $1.00 : 1.10 :: \$ 5.00 : \$ 5.50$ , Ans.

(64.)

Emily, Jane,	Abigail, Nancy,	\$ 19,000
Emily, Jane, Betsey,	Abigail,	19,200
	Jane, Betsey, Abigail, Nancy,	20,000
Emily,	Betsey, Abigail, Nancy,	20,500
Emily, Jane, Betsey,	Nancy,	21,300
		<hr/>
		4) \$ 100,000

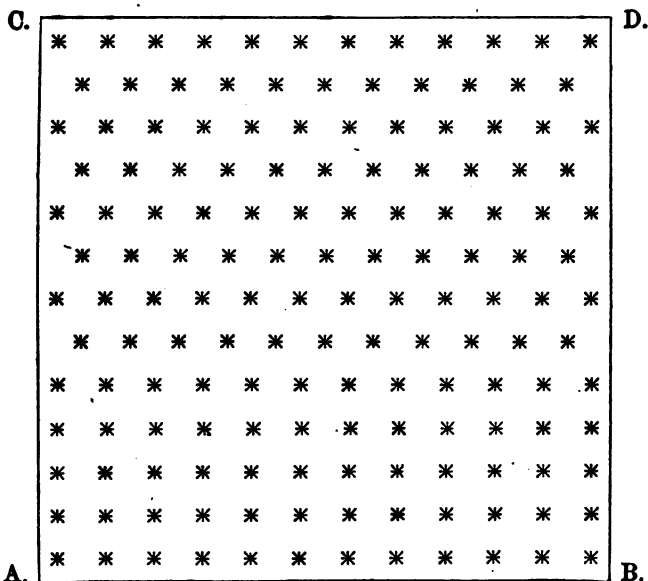
Sum of the fortunes, \$ 25,000

- $\$ 25,000 - \$ 19,000 = \$ 6,000$ , Betsey's fortune.  
 $\$ 25,000 - \$ 19,200 = \$ 5,800$ , Nancy's fortune.  
 $\$ 25,000 - \$ 20,000 = \$ 5,000$ , Emily's fortune.  
 $\$ 25,000 - \$ 20,500 = \$ 4,500$ , Jane's fortune.  
 $\$ 25,000 - \$ 21,300 = \$ 3,700$ , Abigail's fortune.

(65.)

Our garden is 12 rods square ; but, as no tree is to be set within half a rod of the fence, the trees occupy only a space 11 rods square. As our object is to plant the greatest possible number of trees, we first plant the row A B, which will contain 12 trees ;

and above this row we plant 4 other rows, each tree being one rod from any other tree, and the rows one rod apart. We have now a space left which is 11 rods long and 7 rods wide. If we were to plant the remaining trees in the same manner as the others, we would have but 7 more rows, and our garden would have only  $12 \times 12 = 144$  trees. But, if we set out the remainder of the trees in the quincunx order, we shall have 8 more rows, 4 of which containing 12 trees each, and 4 containing 11 trees each. Although the trees are a rod from each other, the rows are only  $1^2 - .5^2 = 1 - .25 = .75$ ;  $\sqrt{.75} = .866 +$  rods apart. We have thus set out 9 rows, each containing 12 trees  $= 12 \times 9 = 108$  trees; and 4 rows, each containing 11 trees  $= 44$  trees. Thus we have  $108 + 44 = 152$  trees, Ans.



THE END.

